NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

FINANCIAL PLANNING MODEL FOR THE ARMED FORCES OF THE PHILIPPINES PROVIDENT TRUST FUND

by

Romeo D.V. Poquiz

December 2000

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Recent developments gave rise to twin problems for the Armed Forces of the Philippines Provident Trust Fund (AFPPTF). Firstly, the AFPPTF, though it has identified the type of assets in its planned portfolio, is not sure how to allocate the assets in the portfolio in order to optimize returns. Secondly, the AFPPTF has no visibility of expected returns in the future years, on which to base its decisions in determining the amount of yearly scholarship assistance. This thesis research aimed to solve these twin problems of the AFPPTF. The research involved two broad steps – data collection and model construction and analysis. Data collection was primarily through literature reviews, archival research, and interviews. The analysis involved simulation through the Monte Carlo method. The model was created using Microsoft Excel spreadsheet, where all the possible variables affecting future portfolio returns and fund balances were linked with the other variables through formulas and equations. These variables, such as initial investment, yearly scholarship and operating expenses, etc., were based on the various yearly cash flows of the AFPPTF. The portfolio returns and yearly fund balances, called "forecasts" in the model, were based on the probability distributions of the historical returns of the assets in the portfolio. Simulation runs, each run involving 5,000 trials, were undertaken to determine the expected portfolio returns and fund balances in a 20-year time horizon. Simulation was also used in determining the optimal asset allocation used in the model. The model may be used by the management of AFPPTF in financial planning by varying certain variables, conducting simulation runs on each variation, creating and analyzing simulation results, and ultimately making decisions.

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FINANCIAL PLANNING MODEL FOR THE ARMED FORCES OF THE PHILIPPINES PROVIDENT TRUST FUND

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ABSTRACT

Recent developments gave rise to twin problems for the Armed Forces of the Philippines Provident Trust Fund (AFPPTF). Firstly, the AFPPTF, though it has identified the type of assets in its planned portfolio, is not sure how to allocate the assets in the portfolio in order to optimize returns. Secondly, the AFPPTF has no visibility of expected returns in the future years, on which to base its decisions in determining the amount of yearly scholarship assistance. This thesis research aimed to solve these twin problems of the AFPPTF. The research involved two broad steps – data collection and model construction and analysis. Data collection was primarily through literature reviews, archival research, and interviews. The analysis involved simulation through the Monte Carlo method. The model was created using Microsoft Excel spreadsheet, where all the possible variables affecting future portfolio returns and fund balances were linked with the other variables through formulas and equations. These variables, such as initial investment, yearly scholarship and operating expenses, etc., were based on the various yearly cash flows of the AFPPTF. The portfolio returns and yearly fund balances, called "forecasts" in the model, were based on the probability distributions of the historical returns of the assets in the portfolio. Simulation runs, each run involving 5,000 trials, were undertaken to determine the expected portfolio returns and fund balances in a 20-year time horizon. Simulation was also used in determining the optimal asset allocation used in the model. The model may be used by the management of AFPPTF in financial planning by varying certain variables, conducting simulation runs on each variation, creating and analyzing simulation results, and ultimately making decisions.

TABLE OF CONTENTS

LIST OF TABLES

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I. INTRODUCTION

A. GENERAL

In 1985, the top leadership of the Armed Forces of the Philippines (AFP) created the Armed Forces of the Philippines Provident Trust Fund (AFPPTF) to provide educational assistance to military personnel and their qualified dependents. The source of funds for the AFPPTF was from the annual rebate from the Special Group Term Insurance (SGTI) coverage for AFP personnel under the AFP Mutual Benefit Association Incorporated (AFPMBAI) system. This annual rebate was called an Experience Refund. The amount of experience refunds given out by AFPMBAI yearly depended on the amount of insurance claims for a particular year. More insurance claims under the SGTI meant less experience refund, and less claims meant more refund.

The AFPPTF would later include two other Program Funds. To make this initial Trust Fund distinct from the two other Funds, the original AFPPTF was called the Armed Forces of the Philippines Personnel (AFP Pers) Program Fund. The AFPPTF is therefore the consolidation of the three program funds.

In 1990, Congress passed Republic Act 6963, which provided for scholarship programs for all legitimate children of military personnel killed or incapacitated in line of duty. This program, called RA 6963 Program Fund, complements the AFP Pers Program Fund. The funds for this program comes from the AFP's share in the firearms license fees collected by the Philippine National Police.

In 1991, the Civilian Armed Forces Geographical Units Active Auxiliaries (CAFGUAA) Program Fund was established and incorporated into the AFPPTF. This program provides educational assistance to the Para-military forces and their dependents. Experience refund from the Personal Accident Insurance with Dismemberment Benefit Master Policy of the AFPMBAI is the source of funds for this program.

Throughout the years, the AFPPTF has grown and the major portion of the yearly cash inflows comes, not from experience refunds, but from investment earnings of the Trust Fund. Since not all the yearly experience refunds and license fees are expended in the educational assistance program, the fund balances are invested to make the Trust Fund continually grow. Investments are only of two types, namely, time deposits in government and private banks, and capital contribution placements in savings and loan associations (S & L). Time deposits earn yearly interest returns of about 10%. Savings and loan associations give out dividends with a yearly average of 22% of invested capital. As of March 31, 2000, 63% of AFPPTF investments are capital contributions, and 36% and 1% are time deposits in government and private banks, respectively. [Ref. 1]

Recent developments, however, have compelled the management of the AFPPTF to explore other investment opportunities. First, they believe that they are not optimizing their returns with only two kinds investments, and therefore are contemplating investing in other instruments. Second, each of the three savings and loan associations sanctioned by the AFP have made a policy setting a cap of seven million pesos (PHP 7 M) for the AFP. This is due to their excess cash liquidity and reduced number of loan borrowers. Under Philippine banking law, savings and loan associations are prohibited from making

investments, aside from giving out loans to that particular S & L's members and reaping interest returns from these loans. [Ref 2]

Aside from these concerns, the AFPPTF management is looking into long-term financial planning for the AFPPTF. The number of beneficiaries provided with educational or scholarship assistance, and the amount of yearly benefits rely heavily on the amount of experience refunds or license fees received and the amount of earnings for the Trust Fund balances. Due to the uncertainty in the amount of experience refunds or license fees, as well as the amount of earnings, there is great difficulty on the part of management to determine the amount to be spent on the yearly educational or scholarship assistance [Ref 2]. The financial plan, therefore, hopes to optimize investment earnings and sustain an optimal amount for scholarship expenses while at the same time have a clear visibility of future returns and Fund balances.

B. OBJECTIVE

The objective of this thesis is to create a model designed to analyze investment asset allocation considering optimal investment returns, which can be used by the AFPPTF management in financial planning. The AFPPPTF management should be able to input different scenarios into the model and manipulate certain variables to assess risks and returns of investments. The model should also be able to show the yearly portfolio returns, the yearly inflows and outflows, and the yearly Fund balances for any particular scenario.

C. RESEARCH QUESTIONS

1. Primary Research Question:

What are the factors the AFPPTF must consider in developing an optimal portfolio allocation, assessing risks and returns, and determining a sustainable yearly educational assistance program?

2. Secondary Research Questions

a. What are the appropriate investment instruments that are available to AFPPTF?

b. How should the portfolio be allocated in order to optimize investment returns?

c. What variables and parameters in the model affect portfolio returns?

d. What are the assumptions to be made in coming up with forecasts in the model?

e. How can the model be used in assessing yearly investment returns and in determining yearly amounts for scholarship assistance?

C. SCOPE AND LIMITATIONS

The thesis will include the determination of the appropriate investment instruments, the optimal portfolio allocation, and a financial planning model to be used by the AFPPTF.

D. METHODOLOGY

The methodology consists of two broad steps – data collection and model construction and analysis. The data collection to be used in the thesis is primarily through literature and archival research and interviews. The analysis involves simulation. Specifically, these consist of the following:

- Conduct a review of related finance literature, particularly on asset allocation, portfolio management, analytical tools, and financial planning models.
- Gather relevant data concerning AFPPTF operations.
- Interview AFPPTF management on their financial plans; investment goals and objectives; policies on investments, planning, and budgeting; and other relevant matters concerning the management and operations of the AFPPTF.
- Historical data will be collected on investment returns for various investment instruments such as, bank savings and time deposits, savings and loan association dividends, treasury bills, treasury bonds, and stocks.
- A spreadsheet model will be created incorporating all relevant financial variables affecting the AFPPTF.
- Monte Carlo method will be used to run a simulation of the model.
- Analysis of the simulation results will be done and conclusion and recommendations will be made.

E. ORGANIZATION OF THESIS

Chapter I provides a general introduction to this thesis, including scope and limitations, methodology, and thesis organization.

Chapter II provides a general background of the AFPPTF, including its objectives, policies and programs, and operational performance.

Chapter III makes an analysis of the financial statements of the AFPPTF, including the balance sheet, income statement, and cash flows.

Chapter IV provides an analysis of the current investments of the AFPPTF, the description of available market instruments in the country, and a description of the portfolio AFPPTF proposes to use in managing its future investments.

Chapter V describes the creation of a spreadsheet model, incorporating relevant variables, parameters, formulas, equations, and historical data. Monte Carlo simulation runs are done using the model created.

Chapter VI describes the analysis of the results of the simulation.

Chapter VII provides final conclusions and recommendations, including suggestions for future research.

II. THE ARMED FORCES OF THE PHILIPPINES PROVIDENT TRUST FUND (AFPPTF)

A. BACKGROUND

The AFPPTF consists of the consolidation of three trust funds with its own specific purpose and classification of beneficiaries, namely, AFP personnel, CAFGU active auxiliaries, and RA 6963 beneficiaries. The AFPPTF was created primarily to provide educational assistance, in the form of a yearly stipend, to qualified beneficiaries.

The AFPPTF is under a Board of Trustees who provides policy guidance and strategic direction for the Fund. The incumbent Deputy Chief of Staff of the Armed Forces of the Philippines, a three-star general, heads the Board. There are eight members of the Board and they consist of the following:

- Deputy Chief of Staff of the Armed Forces of the Philippines for Personnel, J1, who is also the vice chairman
- Assistant Chief of Staff for Personnel of each of the major services (Army, Navy, Air Force)
- Chief, Morale & Welfare Division of the Office of the Deputy Chief of Staff for Personnel, who also acts as the Secretary of the Board
- General Manager of the AFPPTF
- Legal Officer
- Armed Forces of the Philippines Command Sergeant Major

The General Manager of the AFPPTF, who is an active military officer, runs the day-to-day operations of the Fund. Under him are five divisions, namely, Administrative,

Internal Audit, Operations, Legal, and Finance. He determines who should be provided with educational assistance. He makes recommendations to the Board on matters as to type and amount of investments, the amount of educational assistance provided to beneficiaries, and the number of beneficiaries. [Ref. 1]

B. OBJECTIVES

The objectives of the AFPPTF are the following:

- To provide educational assistance to qualified dependents of deceased, disabled, retired or active military personnel, including CAFGUU Active Auxiliaries, giving priority to those most in need.
- To provide educational assistance to qualified military personnel who pursue further education themselves.
- To manage the financial resources of the AFPPTF.
- To sustain the improvement and operation of the AFPPTF.

C. PROGRAMS AND POLICIES

1. Educational Assistance Program for AFP Personnel and Their Dependents

There are three projects under this program. These are the regular educational assistance project, special educational assistance project, and special financial assistance project. Funds to support these projects come from annual experience refunds from SGTI and the earnings from Fund investments.

a. Regular Educational Assistance Project

The level, amount, and duration of stipends are shown in Table 1. The yearly stipend is given to the beneficiaries once a year, that is, at the beginning of the school year for elementary and high school. For college and vocational, the stipend is given twice a year, that is, half the yearly amount every semester.

Level	**Deceased/CDD**	**Active/Retired**	**Duration**
Elementary	2,000	1,000	6 years
High School	3,000	2,000	4 years
College	8,000	5,000	4 or 5 years
Vocational	8,000	5,000	2 years

Table 1. Amount of Stipend (In Philippine Pesos, PHP) "From Ref. 1"

With many applicants for the program and with Fund limitations, there is a need to regulate the number of beneficiaries. A policy on prioritization is being implemented to give assistance to those most in need. The order of priority in giving out assistance is as follows:

- Dependents of deceased or disabled military personnel not covered by RA 6963 Program
- Disabled AFP members on compulsory disability discharge, or CDD status
- Dependents on compulsorily retired AFP members
- Dependents of active Enlisted Personnel and Officers with the rank of Lieutenant Colonel and below

- Dependents of optionally retired AFP members
- Active members of the AFP
- Compulsorily retired members

b. Special Educational Assistance Project

This project is for the benefit of qualified AFP law and engineering students and those reviewing for the Bar and Board examinations. These policies apply in this project: the Committee on Law, Communication-Electronics, and Engineering will do Selection of qualified applicants. Grantees shall be assigned to corresponding technical field of specialization, and mandatory service is required in said field of specialization. The amount of stipend given to active AFP members taking law or engineering courses is PHP 4,000 per semester plus a one-time allowance of PHP 8,000 for Board or Bar review.

c. Special Financial Assistance

This assistance is given as an incentive to student beneficiaries who perform outstandingly in school. The amount of benefits is shown in Table 2.

2. Educational Assistance Program for CAFGU Active Auxiliaries

This program provides assistance to dependents of deceased or disabled CAFGU members, disabled members on CDD status, and dependents of active CAFGU members. The policies and procedures in granting benefits under this program is the same as the regular educational assistance program. The source of funds for this program is from the experience refund of the Personal Accident Insurance with Dismemberment Policy of CAFGU members with AFPMBAI.

Honors Attained in Elementary	Amount
Valedictorian	1,000
Salutatorian	800
1st, 2nd, & 3rd Honorable Mention	600
Every Year in High School	
Avg grade of 95% & above with no grade below 90%	1,000
Avg grade of 90%-95% with no grade below 85%	600
Honors Attained in High School	
Valedictorian	2,000
Salutatorian	1,600
1st, 2nd, & 3rd Honorable Mention	1,200
Every Year in College/Vocational	
Avg grade of 95% & above with no grade below 90%	2,000
Avg grade of 90%-95% with no grade below 85%	1,200

Table 2. Amount of Benefits (In PHP) "From Ref. 1"

3. RA 6963 Scholarship Program

This program, initiated through Congressional action, provides educational assistance to all legitimate children of military personnel killed or incapacitated in the line of duty on or before September 4, 1990. Scholarship, which is limited to tuition and miscellaneous fees, is provided leading to one college degree in a non-exclusive school. The source of funds for this program is from the AFP's share in the firearms license fees collected by the Philippine National Police, as well as from Fund interest earnings.

D. OPERATIONAL PERFORMANCE

For Fiscal Year 1999-2000, there are a total of 7,182 beneficiaries for the AFPPTF. Table 3 shows that AFP personnel has the highest number of beneficiaries (86%) while the beneficiaries in Elementary, High School, and College are more or less evenly distributed.

	Elementary	High School	College	Total	Percentage
AFP Personnel	1,721	2,136	2,300	**6,157**	**86**
CAFGUAA	217	186	122	**525**	**7**
RA 6963	283	138	79	**500**	**7**
Total	**2,221**	**2,460**	**2,501**	**7,182**	
Percentage	**31**	**34**	**35**	**100**	**100**

Table 3. Total Number of Beneficiaries, FY 1999-2000 "From Ref. 1"

The Trust Fund spent PHP 19,812,733 million to support the beneficiaries in FY 1999-2000. The bulk of the funds spent went to College students who received a total of PHP 10,868,479. High school students received PHP 6,072,734, while those in Elementary grades received PHP 2,871,520.

Out of the total of 7,182 beneficiaries for FY 1999-2000, 256 students were given special financial assistance for performing outstandingly in school. The total number of beneficiaries will be increased to 7,799 for FY 2000-2001, with 84% of the intended beneficiaries under the AFP Personnel Program. The programmed amount to be spent for scholarship for the FY 2000-2001 is PHP28.467M. [Ref. 1]

III. AFPPTF FINANCIAL STATEMENTS ANALYSIS

A. GENERAL

This chapter will portray the health of the Trust Fund. Its three financial statements, namely, the balance sheet, income statement, and statement of cash flows will be discussed and a simple analysis will be made. Of primary importance in this chapter is the statement of cash flows, where the yearly inflows and outflows of the three program funds, and the consolidated fund are analyzed. Cash flows from 1985, the date of inception of the AFPPTF, up to 1999, will be analyzed and the historical amounts of cash flows in each year will be considered in the creation of the model in this thesis research.

B. BALANCE SHEET

AFPPTF's balance sheet is presented much like in the private sector format of "Assets = Liabilities + Owner's Equity". It has no liabilities and owners' equity, however. Capital is presented instead of Owner's Equity since there are basically no individual owners of the Trust Fund. As a Trust Fund whose mandate is to provide educational assistance and, at the same time, make investments to make the Fund grow, AFPPTF's assets are mainly in investments, and interest receivables from these investments. Table 4 shows that AFPPTF has total investments of PHP215, 231,812.26 and interest receivables of PHP6, 707,466.98. The use of financial ratios for analysis is not appropriate for the AFPPTF. The peculiar nature of the Trust Fund requires it to have highly liquid assets such as cash, receivables, and investments, which are easily convertible to cash, so that it is able to meet its mandate to provide educational

assistance. It does not have a current and quick ratio, for example, since it does not have liabilities.

The AFPPTF has minimal non-current assets (property and equipment only) amounting to PHP 438,297.58. It has a total capital of PHP124, 225,723.64. This capital is the aggregate amount since the inception of the Trust Fund. It consists of experience refunds from the AFP Personnel SGTI and CAFGU Personal Accident Insurance, and the AFP's share in the firearms license fees collected by the National Police. Donations and special projects came from benevolent organizations and individuals who wanted to help soldiers' dependents go to school. They are treated separately from the capital fund for management purposes. The Retained Earnings of PHP84, 942,898.95 represent the aggregate amount of retained earnings since the inception of the fund. The earnings come from bank interests and other investment returns. The Reserve for Scholarship Payments of PHP 3,663,366.45 is the approved amount by the Board to cover educational assistance for the current school year. The amount actually comes from retained earnings but is treated separately for management control. [Ref. 2]

C. INCOME STATEMENT

The income statement of the AFPPTF is quite simple and straightforward. The revenues come from interest income from its investments in savings banks, savings and loan associations, as well as a minimal amount from discount on bond purchases. The expenses are mostly general and administrative, other operating expenses, and depreciation on property and equipment. As a government Trust Fund, the AFPPTF pays

no income tax. Table 5 shows the income statement for the year ending 31 March 2000. The total expense for the period is PHP 28,469,840.25.

AFP Provident Trust Fund
Consolidated Balance Sheet
As of 31 March 2000

ASSETS

Current Assets:			
Cash on hand			2, 105. 50
Cash in Bank			915, 278.95
Office Supplies			3 9, 393.20
Interest Receivables			6, 707, 466.98
Investments			215, 231, 812.26
Total Current Assets			222, 898, 162.29
Non-current Assets:			
Property and Equipment	1, 205, 027.85		
Less: Accum. Depreciation	766, 730.27		
Total Non-current Assets			438, 297.58
TOTAL ASSETS		**PHP**	**223, 336, 459.97**

CAPITAL

Capital		124, 225, 723.64
Donations and Special Projects		10, 504, 470.93
Retained Earnings		84, 942, 898.95
Reserve for Scholarship Payments		3, 663, 366.45
TOTAL LIABILITIES AND CAPITAL	**PHP**	**223, 336, 459.97**

Table 4. Consolidated Balance Sheet "From Ref. 1"

D. STATEMENT OF CASH FLOW

1. General

The AFPPTF's cash flows are presented differently than those of the private sector. It does not have financing and only has operating and investing cash flows.

Cash Flows are presented using the direct method, that is, actual cash outflows is deducted from actual cash inflows to determine total cash flows for the period. The direct method does not consider depreciation in the cash flow analysis. The analysis of cash flows is the most important area in the analysis of financial statements of AFPPTF. The financial planning model to be developed in the thesis will rely primarily on the amount of yearly inflows and outflows.

2. AFP Personnel Program Fund

Cash inflows for the AFP Personnel Fund come from experience refunds, earnings from investments, and cash donations. Yearly receipts of experience refunds come in different amounts. Some times the amount is low and sometimes it is high. The initial refund of PHP12.607M, which was the highest refund ever received, was made in 1985 during the inception of the Fund. There was no receipt in 1990. The average refund received for the period from 1985 to 1999 was PHP 3.537M. Earnings from investments, which consist of cash dividends received from S & L capital contributions, constitute a bigger source of inflows for this Fund. From an initial amount of PHP 1.548M in 1985, earnings continued to grow over the years. In 1998, earnings amounted to PHP 19.99M. The total inflows over the years were variable as a result of variable refunds. The average inflow over the years was P 13.144M.

Cash outflows consist of two types, namely, payments made to support student beneficiaries, and payments to support the general, administrative and other operating expenses for the period. On the average, PHP 5.586M were spent for scholarship yearly. General, administrative, and other operating expenses continually increased over the

years with an average per year increase of PHP 0.973M. Table 6 shows the amount of yearly cash flows.

Over the years, inflows have far outweighed outflows, thereby accounting for positive cash flows throughout. There was an average of PHP 6.956M in yearly net cash flows.

ARMED FORCES OF THE PHILIPPINES
PROVIDENT TRUST FUND
Income Statement
For the Year Ending 31 March 2000

Revenues	**31, 253, 895.45**
Less: Expenses	
Salaries and Wages	1, 467, 047.00
Employees Benefit	496, 814.00
Meetings and Conferences	64, 510.75
Supplies Expense	199, 759.00
Repair and Maintenance	56, 537.24
Communications	97, 690.71
Contributions	10, 816.00
Representation	60, 235.50
Subscription	8, 131.00
Dissemination Campaign	90, 885.50
Training and Seminar	23, 203.00
Travel	41, 964.00
Office Enhancement	46, 825.00
Depreciation – Prop & Eqpt	119, 636.50
Total Expenses	**2, 784, 055.20**
NET INCOME	**28, 469, 840.25**

Table 5. AFPPTF Income Statement (In PHP) "From Ref. 1"

From its inception in 1985 up to the present, there has been a continuous positive cash flow of the AFP Personnel Program Fund. The Fund started at P13.83M in 1985, and as of 31 December 1999, the Fund has a total fund balance of PHP104.345M. [Ref.1]

AFP Personnel Program Cash Flows
(in PHP)

	Inflows				Outflows			
	Experience Refund	Earnings	Donations	Total Inflows	Scholar-ship Exp.	Operations Exp.	Total Outflows	**Net Cash Flow**
1985	12.607	1.548		14.155		0.325	0.325	**13.830**
1986	3.222	3.055		6.277	0.574	0.231	0.805	**5.472**
1987	0.978	2.380		3.358	0.705	0.348	1.053	**2.305**
1988	0.907	5.595		6.502	1.471	0.349	1.820	**4.682**
1989	1.600	5.076		6.676	2.435	0.345	2.780	**3.896**
1990	0.000	6.403		6.403	2.859	0.323	3.182	**3.221**
1991	0.857	8.064		8.921	3.350	0.710	4.060	**4.861**
1992	1.251	7.977		9.228	3.569	0.623	4.192	**5.036**
1993	1.500	8.562		10.062	4.243	0.886	5.129	**4.933**
1994	3.172	9.166		12.338	6.101	1.114	7.215	**5.123**
1995	3.995	10.159	3.393	17.547	6.275	1.447	7.722	**9.825**
1996	4.343	12.002	3.000	19.345	7.277	1.039	8.316	**11.029**
1997	4.594	13.854	1.000	19.448	8.720	1.778	10.498	**8.950**
1998	9.737	19.990	1.000	30.727	13.839	2.304	16.143	**14.584**
1999	4.291	19.767	2.112	26.170	16.792	2.780	19.572	**6.598**
Total	**53.054**	**133.598**	**10.505**	**197.157**	**78.210**	**14.602**	**92.812**	**104.345**
Ave.	**3.537**	**8.907**	**2.101**	**13.144**	**5.586**	**0.973**	**6.187**	**6.956**

Table 6. AFP Personnel Program Cash Flow "After Ref. 1"

3. CAFGUAA Program Fund

Table 7 shows the yearly cash flows for the CAFGUAA Program Fund. The Fund started with seed capital of PHP 1.595M from experience refunds in 1990. From then on, there has been a continuous positive cash flow every year. As of December 30, 1999, the Fund has a total balance of PHP 27. 272 M. [Ref. 1]

CAFGUAA Program Cash Flows

	Inflows			Outflows			
	Experience Refund	Earnings	Total	Scholar-ship	Operations	Total	Net Cash Flow
1990	1.595	0.113	1.708	0.000	0.000	0.000	**1.708**
1991	1.779	0.762	2.541	0.017	0.000	0.017	**2.524**
1992	0.000	0.943	0.943	0.096	0.002	0.098	**0.845**
1993	1.580	1.277	2.857	0.142	0.021	0.163	**2.694**
1994	1.575	1.568	3.143	0.230	0.117	0.347	**2.796**
1995	1.829	1.830	3.659	0.155	0.324	0.479	**3.180**
1996	1.789	2.666	4.455	0.416	0.373	0.789	**3.666**
1997	0.832	3.172	4.004	0.470	0.530	1.000	**3.004**
1998	2.799	4.846	7.645	0.718	0.072	0.790	**6.855**
1999	1.352	5.904	7.256	1.126	0.083	1.209	**6.047**
Total	**15.130**	**23.081**	**38.211**	**3.370**	**1.522**	**4.892**	**33.319**
Average	**1.513**	**2.308**	**3.821**	**0.337**	**0.152**	**0.489**	**3.332**

Table 7. CAFGUAA Program Fund Cash Flows (In Million PHP) "After Ref. 1"

4. RA 6963 Program Fund

This program is the last of the three Program Funds comprising the AFPPTF. It started in 1993 with seed capital of PHP 19.332 M from the AFP's share in firearms license fees. Table 8 shows the yearly cash flows of this Fund. Like the other program funds, this program has had a positive cash flow throughout the years. The fund balance as of 30 December, 1999 is PHP 78.485M. [Ref. 1]

5. AFPPPTF Yearly Cash Flows

The consolidated summary of the different program funds shows a yearly positive net cash flow. Total inflows always exceeded outflows, increasing fund balances yearly. There are no fixed amounts of inflows or outflows yearly. There are times when experience refunds are high and there are times when they are low. For example, the

total refund was PHP12.607M in 1985, PHP0.907M in 1988, and PHP36.018M in1998 as shown in Table 9. The total yearly average of experience refund, however, was PHP 8.282M, from the inception of the Fund in 1985 to the end of 1999. On the other hand, earnings, which consisted of dividends and interests all in cash, continually increased from year to year, except in 1987 where it declined to PHP2.38M from PHP3.055M in 1986. The yearly average earnings from 1985 to 1999 was PHP12. 407M. [Ref. 1]

RA 6963 Program Cash Flows

	Inflows			Outflows			
	Experience Refund	Earnings	Total Inflows	Scholarship	Operations	Total Outflows	Net Cash Flow
1993	19.332	0.07	19.402	0.016	0.393	0.409	**18.993**
1994	0.473	2.63	3.103	0.157	0.788	0.945	**2.158**
1995	6.042	3.398	9.44	0.264	0.477	0.741	**8.699**
1996	1.446	5.274	6.72	0.441	0.383	0.824	**5.896**
1997	2.888	6.785	9.673	0.894	0.083	0.977	**8.696**
1998	23.482	6.176	29.658	1.12	0.001	1.121	**28.537**
1999	2.377	5.093	7.47	1.943	0.021	1.964	**5.506**
Total	**56.04**	**29.426**	**85.466**	**4.835**	**2.146**	**6.981**	**78.485**
Ave.	**8.006**	**4.204**	**12.209**	**0.691**	**0.307**	**0.997**	**11.212**

Table 8. RA 6963 Program Fund Yearly Cash Flows (In Million PHP) "After Ref. 1"

6. Other Relevant Cash Flow Statistics

There are important statistics that are should be considered in the analysis. While the Trust Fund was created to provide educational assistance or scholarship to beneficiaries, the yearly amount spent on scholarship is quite small when compared to both the yearly net cash flows and yearly fund balance. Table 10 illustrates these important cash flow statistics. As of 30 December 1999, the average percentage spent on

scholarship compared to the net cash flows is 42.5%. When compared to the yearly fund balance, the average percentage spent on scholarship is a mere 6.2% yearly. In fact, there is a policy that states that the yearly expenditures for scholarship assistance should be equal to the previous year's total earnings plus one-half of the previous year's experience refund [Ref. 3]. When we look at the Table 10, however, this policy was never implemented. Actual yearly scholarship expenditure was always less than the desired amount. The variance between the desired and the actual yearly scholarship expenses has a range of PHP 1.4 M to PHP 29.16 M, with a yearly average negative variance of PHP 9.07M.

Consolidated AFPPTF Yearly Cash Flows

(in PHP)

	Inflows				Outflows			Total
	Experience Refund	Earnings	Donations	Total	Scholar-ship	Operations	Total	Net Cash Flow
1985	12.607	1.548		14.155		0.325	0.325	**13.830**
1986	3.222	3.055		6.277	0.574	0.231	0.805	**5.472**
1987	0.978	2.380		3.358	0.705	0.348	1.053	**2.305**
1988	0.907	5.595		6.502	1.471	0.349	1.820	**4.682**
1989	1.600	5.076		6.676	2.435	0.345	2.780	**3.896**
1990	1.595	6.516		8.111	2.859	0.323	3.182	**4.929**
1991	2.636	8.826		11.462	3.367	0.710	4.077	**7.385**
1992	1.251	8.920		10.171	3.665	0.625	4.290	**5.881**
1993	22.412	9.909		32.321	4.401	1.300	5.701	**26.620**
1994	5.220	13.364		18.584	6.488	2.019	8.507	**10.077**
1995	11.866	15.387	3.393	30.646	6.694	2.248	8.942	**21.704**
1996	7.578	19.942	3.000	30.520	8.134	1.795	9.929	**20.591**
1997	8.314	23.811	1.000	33.125	10.084	2.391	12.475	**20.650**
1998	36.018	31.012	1.000	68.030	15.677	2.377	18.054	**49.976**
1999	8.020	30.764	2.112	40.896	19.861	2.884	22.745	**18.151**
Total	**124.224**	**186.105**	**10.505**	**320.834**	**86.415**	**18.270**	**104.685**	**216.149**
Ave.	**8.282**	**12.407**	**2.101**	**21.389**	**6.173**	**1.218**	**6.979**	**14.410**

Table 9. Consolidated AFPPTF Yearly Cash Flows "After Ref. 1"

	Actual Schol. Exp.	Total Net Cash Flow	Cumul. Fund Balance	% Schol. Exp. W/ Net CF	% Schol. w/ Cumul. Balance	Desired Schol. Exp Per Policy	Variance, Desired Vs. Actual Exp.
1985		13.830	13.830	0.000	0.00		
1986	0.574	5.472	19.302	10.490	2.97	7.85	-7.28
1987	0.705	2.305	21.607	30.586	3.26	4.67	-3.96
1988	1.471	4.682	26.289	31.418	5.60	2.87	-1.40
1989	2.435	3.896	30.185	62.500	8.07	6.05	-3.61
1990	2.859	4.929	35.114	58.004	8.14	5.88	-3.02
1991	3.367	7.385	42.499	45.592	7.92	7.31	-3.95
1992	3.665	5.881	48.380	62.319	7.58	10.14	-6.48
1993	4.401	26.620	75.000	16.533	5.87	9.55	-5.14
1994	6.488	10.077	85.077	64.384	7.63	21.12	-14.63
1995	6.694	21.704	106.781	30.842	6.27	15.97	-9.28
1996	8.134	20.591	127.372	39.503	6.39	21.32	-13.19
1997	10.084	20.650	148.022	48.833	6.81	23.73	-13.65
1998	15.677	49.976	197.998	31.369	7.92	27.97	-12.29
1999	19.861	18.151	216.149	109.421	9.19	49.02	-29.16
Total	**86.415**	**216.149**					
Ave.		**14.410**		**42.786**	**6.24**	**15.25**	**-9.07**

Table 10. Important Cash Flow Statistics "After Ref. 1"

The large discrepancy in the actual and desired amount to be spent on scholarship might be due to the difficulty on the part of AFPPTF management to accurately forecast earnings and other inflows, thereby spending conservatively on scholarship or educational assistance, for fear of overspending or depleting the fund too soon. Management may also be spending conservatively in order to allow the fund to grow more speedily, or that the spending policy was really not meant to be implemented. Whatever the reasons are, the financial planning model to be created will clearly show the expected inflows and outflows, and the fund balances in future years, thereby helping AFPPTF management make more confident financial decisions.

In this chapter, we have seen that the AFPPTF is financially healthy due to the continuous excess of cash inflows over cash outflows. Said in another way, its yearly cash receipts of experience refunds, license fees and investment earnings, were more than its yearly expenses, thereby increasing its yearly fund balances. In the long run, however, the AFPPTF must not spend very minimally in scholarship assistance just to allow the Fund to grow. Scholarship assistance is its mandate and it must spend reasonable amounts yearly to meet this mandate of helping an increasing number of beneficiaries. AFPPTF must therefore exert all efforts to accelerate capital growth without necessarily sacrificing scholarship expenditures. One way to do this is selecting an investment portfolio and developing an allocation of assets that optimizes investment returns. The next chapter will deal with the different investment instruments, which were used by the AFPPTF management in coming up with their proposed portfolio. This portfolio will be considered in latter chapters in the determination of the optimal asset allocation.

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IV. ANALYSIS OF AFPPTF INVESTMENTS

A. GENERAL

This chapter provides insight into the different types of investments the AFPPTF currently has, and the status of these investments. The chapter also gives a description of the major market instruments available in the Philippines. The AFPPTF management chose from these instruments in identifying their planned portfolio. The portfolio is identified in this chapter but the optimal allocation of the different asset classes in the portfolio will be determined in a later chapter.

B. CURRENT INVESTMENTS

Sixty three percent of the total investments of AFPPTF are invested in savings and loan associations in the form of capital contributions, which are actually much like time deposits. Interest returns for capital contributions are in the form of dividends, which are computed quarterly, but actual dividends are given out every six months. [Ref. 5] On the average, the rate of dividends given out is 22% per annum. There are three savings and loan associations, which are sanctioned by the AFP. These are: the Armed Forces and Police Savings and Loan Association Incorporated (AFPSLAI), Air Materiel Savings and Loan Association Incorporated (AMWSLAI), and Composite Wing Savings and Loan Association Incorporated (CWSLAI). These institutions were actually created to service uniformed-members and civilian employees of the AFP, Police and the Department of National Defense. The ACDI, or Aces Credit Development Incorporated, is a credit union among active and retired members of the military. ACDI functions like

a savings and loan association and, although investments are in the form of time deposits, interest returns are more or less the same as capital contribution dividends. AFPPTF management, therefore, considers ACDI as a savings and loan association and it will be treated as such in this research. PHP 5.0M in CAFGUAA Program Funds is invested in ACDI. [Ref. 4]

Table 11 shows the schedule of current investments of the AFPPTF, arranged according to investment institution. Thirty-six percent of total investments consists of time deposits in Land Bank, including PHP 1.0 M in 5-year Treasury bonds. Land Bank is the official depository bank of the Philippine government. May Bank is a private bank and holds PHP 2.392M in CAFGUAA time deposits. Time deposits in either government or private banks earn interest of 10% on average. Five-year treasury bonds earn about 13% on average [Ref. 1].

Table 12 shows the schedule of investments arranged according to program funds. All of the AFP Personnel Program Fund's total investment of PHP103.8M is placed in savings and loan associations. Almost all of CAFGUAA funds are also in savings and loan associations. The RA 6963 Program funds are all invested in the Land Bank, PHP 77.3M in time deposits and PHP1.0 M in 5-year treasury bonds. Since RA 6963 program funds come from license fees, which are actually government funds, laws demand that these funds can only be invested in government depository banks as deposits or as investments in government securities. Investments in future AFPTF portfolios therefore must consider this requirement. There is no investment limitation like this for both the AFP Personnel and CAFGUAA Program Funds. Funds for these programs can be invested in either government or commercial securities. Likewise, although the AFP

sanctioned savings and loan associations investments, RA 6963 Program funds cannot be invested in them as required by regulations. [Ref. 5] Forty-eight percent of the total AFPPTF investments are AFP Personnel Program Funds, 15% are CAFGUAA, and 36% are RA 6963 Program funds.

Schedule of Investment

(As of 31 March 2000)

Investment Institution	Type of Institution	Type of Account	Total Investment
AFPSLAI	Savings & Loan Assn.	Capital Contribution	63,812,636.59
AMWSLAI	Savings & Loan Assn.	Capital Contribution	60,000,000.00
CWSLAI	Savings & Loan Assn.	Capital Contribution	5,779,884.40
ACDI	Credit Union	Time Deposit	5,000,000.00
May Bank	Private Bank	Time Deposit	2,391,664.40
Land Bank	Gov't Bank	Time Deposit	77,247,626.87
Land Bank	Gov't Bank	Gov't Treasury Bond	1,000,000.00
Grand Total			**PHP 215,231,812.26**

Table 11. Schedule of Investments According to Institution "From Ref. 1"

As mentioned earlier, the different types of AFPPTF investments have different returns on investment. Savings and loan associations have average returns at 22.24% [Ref. 5] per annum, time deposits at 10%, and treasury bonds at 13.36% [Ref. 6]. Overall, however, the AFPPTF yearly returns on investment (ROI) ranged from 12% to 24%, with an average of 18% for the 15-year period from 1985 to 1999. [Ref. 4] Table 13 shows the yearly ROI, which is measured by dividing the current year earnings with the sum of the previous year balance and the current experience refund.

It must be understood that there is a recent policy among the three savings and loan associations and ACDI to limit AFPPTF investments to PHP 7.0 M in each of the four institutions. This policy took effect last June 2000. The Chief of Staff of the AFP, however, has requested a little more time to determine other viable investments

elsewhere. The model to be developed should therefore consider this investment constraint on the savings and loan associations. [Ref. 7]

Schedule of Investment
As of 31 March 2000

Institution	Type of Account		Total
AFP Personnel Program Fund			
AFPSLAI	Capital Contribution		54,189,818.95
AMWSLAI	Capital Contribution		43,854,048.36
CWSLAI	Capital Contribution		5,779,884.40
Total			**103,823,751.71**
CAFGUAA Program Fund			
AFPSLAI	Capital Contribution		9,622,817.64
AMWSLAI	Capital Contribution		16,145,951.64
ACDI	Time Deposit		5,000,000.00
May Bank	Time Deposit		2,391,664.40
Total			**33,160,433.68**
RA 6963 Program Fund			
Land Bank	Time Deposit		77,247,626.87
Land Bank	Gov't Treasury Bond		1,000,000.00
Total			**78,247,626.87**
Grand Total		**PHP**	**215,231,812.26**

Table 12. Schedule of Investment According to Program Fund "After Ref. 1"

C. AVAILABLE MARKET INSTRUMENTS

The following are the major market instruments available in the Philippines:

1. Money Market

a. Treasury Bills

This instrument is sold by the Treasury to finance government expenditures. It is virtually default-free. It has 91-day, 182-day, and 364-day maturities. The interest rate on all maturities is 10.25% on August 2000.

Annual Returns on Investment, Overall

Year	Exp. Refund	Earnings	Fund Balance	ROI
1985	12.61	1.55	13.83	
1986	3.22	3.06	19.30	**18%**
1987	0.98	2.38	21.61	**12%**
1988	0.91	5.60	26.29	**24%**
1989	1.6	5.08	30.19	**18%**
1990	1.6	6.52	35.11	**21%**
1991	2.64	8.83	42.50	**23%**
1992	1.25	8.92	48.38	**20%**
1993	22.41	9.91	75.00	**14%**
1994	5.22	13.36	85.08	**17%**
1995	11.87	15.39	106.78	**16%**
1996	7.58	19.94	127.37	**17%**
1997	8.31	23.81	148.02	**18%**
1998	36.02	31.01	198.00	**17%**
1999	8.02	30.76	216.15	**15%**
		Average	**=**	**18%**

Table 13. AFPPTF Yearly Overall ROI "After Ref. 1"

b. Commercial Paper

Financially secure firms issue this instrument to large investors. It has low default risk, has maturity of up to 270 days. It had an interest rate of 11.05% in August 2000.

c. Negotiable Certificates of Deposit (CDs)

Major money-center commercial banks issue this instrument to large investors. Its default risk depends on the strength of the issuing bank. It has a maturity of up to one year. It had an interest rate of 9.785% in August 2000.

2. Capital Market

a. *Treasury Bonds*

The government issues this instrument. It has no default risk, but price will decline if interest rates rise. There are 2-year, 5-year, 7-year, and 10-year treasury bonds, which had interest rates of 12.5%, 13.5%, 14.25%, and 14.63%, respectively, as of September 2000. [Ref. 6]

b. Corporate Bonds

Corporations issue this instrument to individuals and institutional investors. It is riskier than government securities, but less risky than preferred and common stocks. Varying degree of risk depends on the strength of the issuer. Maturity is up to 40 years.

c. Preferred Stocks

Corporations issue this instrument to individuals and institutional investors. It is riskier than corporate bonds, but less risky than common stocks. It has unlimited maturity.

d. Common Stocks

Corporations also issue this instrument, which is risky. It has unlimited maturity. [Ref. 8]

D. PLANNNED PORTFOLIO

A comparison of the interest returns of the money market instruments and treasury bonds in the previous section with the dividends from S & L capital contributions reveals that the latter still provide the highest returns. S & L had an average

return of investment of 22.24% from 1990-1999. This is about 54% more than the returns on treasury bills, and about 36% more than the returns on treasury bonds. Much as AFPPTF would like to maintain its current investments in the S & L, it cannot do so due to the imposition of an investment cap by the S & L institutions on the AFPPTF as earlier discussed. The AFPPTF management must then look for other investment instruments. They have in fact identified the investment instruments to complement their investments in the S & L. They have decided to invest in three kinds of securities: treasury bills, treasury bonds, and stocks, but are not sure of the right portfolio and its allocation. [Ref. 4]

The AFPPTF has a current investment of PHP1.0M in 5-year treasury bonds. It should not have problems with increasing this investment. The AFPPTF can invest in a combination of 91-day, 182-day, or 362-day T–bills. There should be no problem since investment is simple and straightforward. The AFPPTF may have some problems with investments in stocks. It has no experience in stocks and it has limited expertise in fundamental and technical analyses in stock selection [Ref. 9]. To lessen the risks in stock investment, this researcher recommends that the AFPPTF make its initial investments in blue chip or high-cap stocks, which are the stocks of the top 100 corporations of the Philippines. Blue chips have established performance histories and generally carry less risk. Small company stocks may have greater growth potential and higher possible returns, but they are also more volatile [Ref. 10]. AFPPTF may venture in the riskier small company or even growth stocks in the future, when its people have gotten enough training and experience.

With these considerations, the AFPPTF portfolio will then consist of Capital Contribution (S & L), High-cap Stocks, Treasury Bills, and Treasury Bonds. The determination of the optimal allocation of these asset classes is one of the objectives of this thesis and will be discussed in succeeding chapters.

V. COMPUTER SIMULATION MODEL

A. GENERAL

This chapter discusses the creation of the model. The different variables, parameters, formulas and equations, scenarios, and assumptions to be used in creating the model will be explained in detail in the chapter. A section on how the optimal asset allocation will be determined using simulation will also be discussed in this chapter. For those who desire to learn how to run the simulation, the step-by-step procedures are found in Appendix M.

1. Definition of Simulation

Simulation is a representation of a real world situation by some simple and easily manipulated model [Ref. 11]. It is an experiment conducted in a controlled environment, in a controlled setting, rather than in a real setting. Simulation provides an opportunity to manipulate the variables to evaluate the effect of policies over time, and formulate a plan of action. It is a problem-solving tool, not an end in itself.

2. Elements of Simulation

The elements of a simulation model are variables and parameters. Variables are those elements of the model that take on different values over time. There are three variables, namely, state, decision or policy, and environmental or external variables. State variables reflect the state of system at any point in time. They may be given initial values but the simulation model will generate new values according to their relationship with

other variables. The state variables are the "changing cells" in the simulation because they take on different values according to their relationships with other variables, during a simulation run. Decision or policy variables take on new values as a result of intervention of decision by the decision maker. The intervention is done before a simulation is run. Environmental variables are beyond the control of the decision maker but still have significant impact on the simulation model.

Parameters are considered to be those attribute values that do not change during the simulation. If you treat any factor as a constant during a simulation, the factor is parameter of the simulation model. For example, if we assume that the production lead-time is five weeks, it is a parameter. On the other hand, the lead-time may become a state variable if it is dependent on material supplier's delivery schedules. In simulation, it is necessary to state only initially what the parameter value is. [Ref. 12].

B. CREATION OF THE MODEL

1. Background

A spreadsheet model may be generated using Lotus 1-2-3 or Microsoft Excel. An "add-in" computer program, Crystal Ball, is used to run the simulation. This paper used the Microsoft excel in the spreadsheet model. Historical data was used to define the probabilistic assumptions of all applicable variables. Since the mean and standard deviation of the historical returns for each of the asset class in the portfolio were available, normal distribution were used in the probabilistic assumption. Although there is no certainty that history will repeat itself, past returns over long periods of time can be a good measure for estimating future investment returns [Ref. 13]. Mean historical

returns are a good forecast for future returns while standard deviation is a good measure of riskiness of a particular asset in the portfolio. The smaller the standard deviation, the tighter the probability distribution, and accordingly, the lower the riskiness of the stock or asset in the portfolio [Ref. 8].

There are five steps, which must be taken before the simulation can be performed. These are:

- Decide the scope of the model, i.e., which variables are to be included.
- Analyze the importance of each variable; decide whether it will be treated as a state variable, a decision or policy variable, or an environmental variable.
- Select the forecast/s for the model. These are the numerical values we want to determine from simulation, which are later important in making decisions. The simulation generates reports for the forecast/s only.
- Relate the variables to one another by means of equations.
- Generate the probability functions or historical frequency data for variables involving uncertainty.

The model created for the AFPPTF uses Microsoft Excel spreadsheet to relate all the variables and parameters by means of formulas and equations. The initial amount of AFPPTF investments, the scholarship and operating expenses, the yearly experience refund and their yearly changes are all inputted in the model. The probability distribution of each asset class in the portfolio, based on its mean historical return and its standard deviation, is used in forecasting its future risks and returns. The beginning and ending balances, earnings, and scholarship and operating expenses in each year of the 20-year

time horizon for the model, is determined through formulas and equations. The operation of the AFPPTF is expected to span infinite years, but for the model to be created, a 20-year time horizon is used, although management can make a financial plan depending on the number of years for which they want to have a forecast.

There are many forecast values for the portfolio in the model. These include the 20 yearly portfolio returns, 20 yearly fund balances, and the 20-year average portfolio return. So as not to complicate matters for post-simulation analysis, however, only three forecasts will be selected. Only one forecast may be selected, such as the average portfolio return or the year 2020 fund balance, but one of them may not be enough to represent the results one needs on which to base his or her decisions during analysis. The three forecasts selected are the ending fund balance for the first year (2001), ending fund balance for the last year (2020), and the average portfolio return for the 20-year time horizon. These three forecasts are adequate representations of the many possible forecasts, whose values are important in analyzing the simulation results.

Two steps may be undertaken in the analysis of simulation results. First, forecast results may be compared for each investment or operational decision or for each scenario, where the one with the highest fund balance or average portfolio return, and with the least standard deviation, will be selected. Second, the probability distribution charts of the simulation forecasts may be manipulated for "what if" analysis, such as in determining the probability or certainty of attaining a certain fund balance or portfolio return, or in determining the risk of a particular investment decision.

To illustrate the usefulness of the model in financial planning, three scenarios will be simulated. These scenarios will be explained later in the chapter. Aside from scenario

simulation, the model will also be used in determining the optimal asset allocation, which will also be discussed later in the chapter.

2. Explanation of the Data

All the data in the model are based on the historical returns on investment on S & L, stocks, treasury bills, and treasury bonds. The historical data on stocks, S & L, inflation rate, and the sources of these data are found in Appendix A. The list and sources of data on the government securities are found in Appendix B.

The S & L returns came from the yearly returns of the AFPSLAI, AMWSLAI, CWSLAI, and ACDI from 1990 to 1999. The data on stocks are the average historical returns of the top 100 Philippine corporations, considered high-cap corporations, from 1969 to 1999. The data on treasury bills, or T-bills, are the weighted average of interest returns (WAIR) of all maturities. The data on treasury bonds, or T-bonds, are the average of the 5-year government bonds.

3. Explanation of the Variables

The model to be created for the AFPPTF will have no parameters. It has only variables. A model may be created without parameters, but one cannot create a model without variables. While it is important to identify a factor as either a parameter or a variable, incorrectly identifying so will not change the simulation results, so long as its relationships with the other variables are correct [Ref. 17].

All the decision or policy variables of the model are the only ones that can be varied during analysis. The environmental variables cannot be varied. The state variables

also cannot be varied. During simulation runs, the state variables take on different values according to their relationship with the other variables. The following are the variables of the model:

a. Initial Amount of Investment

This is a decision or policy variable. The analyst may vary the initial amount of investment. This amount may be varied based on the decision of the analyst or based on certain policies of the analyst's company or unit. Once an amount is inputted, it remains constant during the simulation run. Although this amount remains constant while the simulation is running, this does not make it a parameter. Since it can be varied by the analyst before simulation run, it remains a decision variable. In the model, the initial investment is assumed to be PHP253.72M, which is equal to the amount of investments for year 2000 (PHP 215.23M), plus the expected earnings for year 2000 of PHP 38.49M. This amount of earnings is taken from the total year 2000 investments (PHP 215.23M) multiplied by 18%, which is the average total ROI based on historical data, as earlier shown in Table 13.

b. Initial Scholarship Expenditures

This is also a decision or policy variable. The analyst may input any amount as initial scholarship expenditure before the simulation is run. The model will assume that PHP24.354M is the initial scholarship expenditure. This is the amount required by AFPPTF policy to be spent for scholarship expenditures for year 2000. Other amounts may be inputted, like the amounts in the three scenarios to be discussed later in the chapter.

c. Yearly Amount of Change for Scholarship Expenditures

This is either a decision or environmental variable. It is a decision variable when the analyst or the management of AFPPTF decides on the amount of yearly change. A formula for determining this amount may also be used, like the one under the current policy of AFPPTF. This policy stipulates that the yearly amount to be spent for scholarship should be equal to all the earnings of the previous year, plus one-half of the experience refunds for the previous year. The yearly change may also be an environmental variable, as when the yearly increase is based on the inflation rate. In the model, three scenarios will be examined where this variable is either an amount based on inflation rate, or an amount based on policy, or an amount based on historical figures.

d. Initial Operating Expenditures

This is a decision variable. The initial operating expense for year 2001 is assumed at PHP 3.174M, which is equal to the operating expenses for year 2000 plus the an increase of 10.04%, which is the yearly increase in operating expenses based on historical figures. Appendix C shows the yearly increase in operating expenses.

e. Yearly Change of Operating Expenses

This is like the yearly change of scholarship expenditures. It can either be a decision or an environmental variable. It is a decision variable when AFPPTF bases the amount on a policy they make or something they can control. The model will use both the inflation rate and the historical rate of change as the measure of yearly change. When inflation rate is used to predict the change of operating expenditures, this variable becomes environmental because this rate is beyond the control of the analyst or of the decision maker.

f. Percentage of Asset Allocation in the Portfolio

The percentage of each asset class to be allocated in the portfolio is a decision variable. The analyst may input any allocation he or she wants, and run a simulation on any of these allocations to determine the return on the portfolio or the fund balance of any particular year. This researcher will recommend an optimal asset allocation later in the chapter. This optimal allocation will be used constantly during simulation runs in all the three suggested scenarios to be discussed later in the chapter. However, the constant use of the recommended optimal allocation in the scenarios will not make the percentage asset allocation a parameter. It remains a decision variable, because the analyst may or may not follow the recommended optimal allocation, and is free to input any amount based entirely on his or her own policy or decision.

The determination of the optimal allocation is the first stage of the two-stage use of the model. The second stage is the use the optimal allocation in determining future investment returns and their corresponding risks. The processes of these two stages will be discussed later in the chapter.

g. The Amount of Experience Refunds/Donations and License fees in Succeeding Years

This is an environmental variable. Management does not have control over how much experience refund is given to AFPPTF yearly. The amount is dependent on the amount of insurance claims for a particular year. In the model, the mean or average of yearly changes based on historical figures will be used, which is PHP 8.982M. During simulation runs, this variable will take on different values around the mean based on the standard deviation of PHP10.031M, which is also based on the historical figures.

Appendix D shows the mean and standard deviation for experience refunds and donations.

h. Returns on Investment for Capital Contributions (S & L), High-Cap Stocks, Treasury Bills, and Treasury Bonds

These are all state variables. The returns are changing during the simulation runs and they are based on the mean and standard deviation of their respective historical returns.

4. Explanation of the Formulas and Equations

a. Yearly Portfolio Return, PR

PR = P1k1 + P2k2 + P3k3 + P4k4

where, P1 is the % portfolio allocation for S & L capital contribution,

P2 is the % portfolio allocation for high cap stocks,

P3 is the % portfolio allocation for treasury bills,

P4 is the % portfolio allocation for treasury bonds,

k1 is the simulation return for S & L capital contribution,

k2 is the simulation return for high cap stocks,

k3 is the simulation return for treasury bills, and

k4 is the simulation return for treasury bonds.

b. Average Portfolio Return, APR

This is equal to the sum of the yearly portfolio returns divided by the number of years, which is 20 in the model. This is one of the three forecasts required in

the model. The two other forecasts are year 2001 fund balance (first year) and year 2020 fund balance (last year).

c. ***Earnings for the Year, YE***

$$YE = (BB - (SE + OE)/2) \times PR$$

where, BB is the beginning balance of portfolio for the year,

SE is the scholarship or educational assistance expense for the year,

OE is the operating expense for the year, and

PR is the portfolio return for the year.

d. ***Ending Balance, EB***

$$EB = BB - SE - OE + YE$$

e. ***Beginning Balance for succeeding years, BBSY***

$$BBSY = EBPY + MER$$

where, EBPY is the ending balance for the preceding year, and

MER is experience refunds.

f. ***Scholarship Expense for Succeeding Year, SESY*** **(Scenario 1)**

$$SESY = PYSE + (YSEI \times PYSE)$$

where, PYSE is the preceding year scholarship expenses, and

YSEI is the rate of increase in yearly scholarship expenses, with historical mean of 22.62%. (see Appendix C).

g. ***Scholarship Expense for Succeeding Year, SESY*** **(Scenario 2)**

$$SESY = PYE + (\tfrac{1}{2} \times PYER)$$

where, PYE is the preceding year earnings, and

PYER is the preceding year experience refund.

h. Succeeding Year Experience Refund, SYER

SYER = PYER + (ER Increase + PYER)

where, ER Increase is the historical amount of annual increase in experience refunds, with mean of PHP 8,982.

i. Scholarship Expense for Succeeding year, SESY **(Scenario 3)**

SESY = PYSE x (1 + SIR)

where, SIR is the inflation rate (8.91%, but will change according to standard deviation during simulation).

j. Operating Expense for Succeeding Year, OESY **(Scenarios 2& 3)**

OESY = PYOE x (1 + SIR)

where, PYOE is the preceding year operating expense.

k. Operating Expense for Succeeding Year, OESY **(Scenario 1)**

OESY = PYOE + (10.04% x PYOE)

where, 10.04% is the historical mean of yearly increase in operating expenses (see Appendix C).

The relationships between these equations and formulas with the different variables can be found in the spreadsheet model in Appendix E. The forecast values displayed in the Appendix are deterministic in that simulation has not yet been run and the probability functions have not yet been applied.

5. Explanation of the Scenarios

The usefulness of the model will be illustrated in the ability of the analyst to manipulate the different decision variables to determine the effects of any inputs on the forecasts. An analyst can input any amount in manipulating the variables. These inputs may be amounts determined in an instant without basis at all. These inputs may also be based on certain concrete measures like those on policies, historical figures, standards, and industry benchmarks. This research, however, will simulate certain scenarios based on certain concrete measures. There are many possible scenarios that can be used in the model, depending on the creativity of the analyst. This researcher has determined three scenarios that he believes give the best options for the AFPPTF management in making decisions. These scenarios require manipulating the yearly increase of experience refunds, and the scholarship and operating expenses, based on certain concrete measures.

The first scenario involves the use of historical mean in determining the succeeding experience refunds and operating expenses. The yearly increase of experience refund is based on a yearly historical increase with mean of PHP8.982M, and with a standard deviation of PHP 10.031M. The operating expense for succeeding years is based on a historical mean of 10.04% with a standard deviation of 28.03% of yearly change (increase).

The second scenario involves the use of a policy formula on the amount of yearly scholarship expenses and inflation rate for operating expenses. As earlier mentioned, the policy requires that the scholarship expenses for succeeding years should be equal to the amount of earnings for the previous year plus one-half of the experience refunds for the previous year. It must be noted, however, that this policy was never implemented as can

be observed from the yearly cash flows. This may be due to the lack of visibility on the part of AFPPTF management of how this affects future returns and fund balances. The yearly operating expenses, on the other hand, should increase yearly corresponding to the amount of the inflation rate of 8.91% and a standard deviation of 3.34%.

The third scenario uses inflation rates in determining both the succeeding scholarship and operating expenses.

These three scenarios will be compared and an analysis will be made to illustrate how the model will be used in financial planning.

6. Assumptions

a. Simulation Assumptions

The simulation will take into consideration the following assumptions:

1). The expected portfolio returns will be based on a normal probability distribution, whose mean and standard deviation are calculated using historical returns on investment of each asset class. The following means and standard deviations calculated from historical data will be used (see Appendix B):

Asset class	*Mean Return*	*Std Dev Return*
Cash, S & L	22.24%	1.07%
Hi- cap stocks	16.30%	23.70%
T-Bills	15.72%	4.39%
T-Bonds	13.36%	1.06%

2). The standard deviation is the only measure of risk in the portfolio. Covariance, or the measure, which combines the variance or volatility of asset returns

with the tendency of those returns to move up or down at the same time other assets move up or down is not considered in this research. The simulation assumes that the covariance of returns for the different asset classes is zero.

b. General Assumptions

1). A model will only be developed for the AFPPTF as a whole and not for the individual program funds.

2). The model will only consider experience refunds and earnings as inflows during the modeling. The donation is very minimal and given only in three years of the fifteen year lifespan of the AFPPTF.

7. Initial Asset Allocation Portfolio

As mentioned earlier, the model will first be used to determine the optimal asset allocation in the portfolio. Before the optimal allocation is determined with the help of simulation, an initial asset allocation must first be determined. The idea for an initial asset allocation is to have a base figure around which possible asset allocations will be selected later before simulation. Having a base figure will prevent the selection of possible asset allocations that will result in forecasts that are either too high or too low to be considered optimal, thereby simplifying the optimal asset allocation selection process. This initial asset allocation is determined, roughly, at least initially, by comparing the historical means and standard deviations of the four asset classes in the portfolio. Since the S & L investment has a constraint of PHP 28.0M, it can only be allocated a maximum of 11% in the portfolio. This 11% S & L allocation is determined by dividing the initial investment of PHP 253.72M by the S & L constraint of PHP28.0M.

The three remaining asset classes will divide the remaining 89% allocation of the portfolio. The following shows the historical means and standard deviations of returns for the asset classes:

Asset class	*Mean Return*	*Std Dev of Return*
Cash, S & L	22.24%	1.07%
Hi- cap stocks	16.30%	23.70%
T-Bills	15.72%	4.39%
T-Bonds	13.36%	1.06%

Mean return, and secondarily standard deviation of returns, is the criteria for determining the proportion of each asset class in the initial portfolio. Since high-cap stocks have the highest mean historical return on investment, they are assigned the highest allocation. The next highest allocation goes to treasury bills, which have returns of 15.72%. Treasury bonds are assigned the lowest allocation because they have the lowest return. Due to the fact that their historical returns are very close, high-cap stocks and treasury bills should have allocations very close to each other, however, their standard deviations suggest otherwise. The standard deviation of high-cap stocks is very high (23.70%) and therefore much riskier when compared to treasury bills, which have a standard deviation of 4.39%. The highest allocation should therefore be given to treasury bills, followed by high-cap stocks, and treasury bonds.

The final step in the initial asset allocation process is the actual determination of the percentage of asset allocation in the portfolio through rough estimation. Since treasury bills have the lesser risk but comparable return to high-cap stocks, it should be given an allocation of about half of the portfolio (50%). To capitalize on the high returns for

high-cap stocks, though riskier than treasury bills, it should be allocated about 35% of the portfolio. The remaining allocation of 4% will be given to treasury bonds. Therefore, the recommended initial asset allocation is 11% S & L, 35% high-cap stocks, 50% T-bills, and 4% T-bonds. It must be noted that this allocation is tentative and still not the optimal allocation. It must also be noted that risks are not yet incorporated into the analysis in the selection of this initial allocation A filtering process to refine or validate this initial allocation will be done through simulation to determine the optimal asset allocation. Risk analysis will then be undertaken during this stage of the optimal asset allocation process.

8. Simulation Analysis to Determine Optimal Asset Allocation

The determination of the optimal asset allocation will be done through the following process:

- List all possible asset allocations to be analyzed. To simplify this process, a subset of the possible allocations, not too far off from the initial allocation earlier determined, should be selected. In this thesis, 50 asset allocations were selected systematically. The selection started from the base figure, the initial asset allocation. Selection of an allocation is done primarily by increasing or decreasing the High-cap stocks and T-bills allocations – the two assets having the highest allocations, by an increment of 1%, up to a range of 15%. There was no need to increase or decrease the T-bonds allocation since the formula in the model automatically adjusts the T-bonds allocation for every assignment of an allocation to either High-cap stocks or T-bills. In each selection, the sum of all the asset

allocations (in %) in the portfolio must equal be to 100%, with the S & L allocation fixed at 11% in every selection of allocation as discussed earlier in the chapter.

- Designate the forecast/s to be made by which to compare simulation results. This researcher has designated Year 2001 Fund Balance and Year 2020 Fund Balance as the forecasts. These forecasts will not only show the risks and returns in one year but also the effects of time in the risks and returns.
- Conduct simulation runs on each possible allocation.
- Compare forecasts results from the simulations of all the allocations. Four primary criteria for both year 2001 and year 2020 will be used in selecting the optimal asset allocation. The criteria, which are arranged according to importance, are: mean return, standard deviation, coefficient of variation or variability, and standard error of the mean. The allocation with the highest mean return, and which has the least standard deviation, the least coefficient of variation, and the least standard error of the mean for both year 2001 and year 2020 will be selected as the optimal asset allocation.

In this research, fifty possible asset allocations were selected and each allocation underwent simulation runs. Because of space considerations, however, only the 15 allocations with the highest 2001 and 2020 fund balances are in this report for illustration. Table 14 shows the top 15 allocations, which are arranged accordingly as S & L, High-cap stocks, T-bills, and T-bonds. The simulation reports for these 15 possible allocations are found in Appendix F.

Allocations	Mean	Std Deviation	Coeff. of Variation	Mean Std of Error
1: 11%, 35% 50%, 4%				
2001 Fund Balance	265,589	20,948	0.08	296.26
2020 Fund Balance	383,913	116,450	0.30	1646.86
Total	**649,502**	**137,398**	**0.38**	**1943.12**
2: 11%, 30%, 55%, 4%				
2001 Fund Balance	265,734	17,941	0.07	253.72
2020 Fund Balance	384,442	120,189	0.31	1699.73
Total	**650,176**	**138,130**	**0.38**	**1,953.45**
3: 11%, 30%, 50%, 9%				
2001 Fund Balance	265,338	17,941	0.07	253.72
2020 Fund Balance	381,930	116,035	0.30	1640.98
Total	**647,268**	**133,976**	**0.37**	**1894.70**
4: 11%, 30%, 45%, 14%				
2001 Fund Balance	265,273	17,894	0.07	253.05
2020 Fund Balance	382,729	117,266	0.31	1658.39
Total	**648,002**	**135,160**	**0.38**	**1911.44**
5: 11%, 25%, 50%, 14%				
2001 Fund Balance	265,434	15,267	0.06	215.91
2020 Fund Balance	380,215	115,157	0.30	1628.57
Total	**645,649**	**130,424**	**0.36**	**1844.48**
6: 11%, 35%, 45%, 9%				
2001 Fund Balance	265,297	21,048	0.08	297.66
2020 Fund Balance	385,307	116,910	0.30	1653.35
Total	**650,604**	**137,958**	**0.38**	**1951.01**
7: 11%, 40%, 45%, 4%				
2001 Fund Balance	266,123	23,443	0.09	331.53
2020 Fund Balance	383,434	118,315	0.31	1673.22
Total	**649,557**	**141,758**	**0.40**	**2004.75**
8: 11%, 37%, 45%, 7%				
2001 Fund Balance	265,655	21,567	0.08	305.01
2020 Fund Balance	384,091	118,126	0.31	1670.56
Total	**649,746**	**139,693**	**0.39**	**1975.57**
9: 11%, 37%, 48%, 4%				
2001 Fund Balance	265,768	21,599	0.08	305.45
2020 Fund Balance	380,571	119,602	0.31	1691.43
Total	**646,339**	**141,201**	**0.39**	**1996.88**
10: 11%, 30%, 57%, 2%				
2001 Fund Balance	265,935	18,263	0.07	258.28
2020 Fund Balance	385,919	117,350	0.30	1659.58
Total	**651,854**	**135,613**	**0.37**	**1917.86**
11: 11%, 30%, 58%, 1%				
2001 Fund Balance	266,034	17,797	0.07	251.69
2020 Fund Balance	386,353	116,703	0.30	1650.43
Total	**652,387**	**134,500**	**0.37**	**1902.12**
12: 11%, 31%, 58%, 0%				
2001 Fund Balance	266,102	18,503	0.07	261.67

2020 Fund Balance	385,861	115,704	0.30	1636.30
Total	**651,963**	**134,207**	**0.37**	**1897.97**
13: 11%, 30%, 59%, 0%				
2001 Fund Balance	266,179	17,877	0.07	252.82
2020 Fund Balance	382,638	114,655	0.30	1621.46
Total	**648,817**	**132,532**	**0.37**	**1874.28**
14: 11%, 32%, 57%, 0%				
2001 Fund Balance	266,471	19,025	0.07	269.05
2020 Fund Balance	384,805	117,189	0.30	1657.30
Total	**651,276**	**136,214**	**0.37**	**1926.35**
15: 11%, 31%, 57%, 1%				
2001 Fund Balance	265,885	18,781	0.07	265.60
2020 Fund Balance	385,811	116,031	0.30	1640.93
Total	**651,696**	**134,812**	**0.37**	**1906.53**

Table 14. Top 15 Asset Allocation Results "From APPENDIX F"

The analysis of the simulation reports and the selection of the optimal asset allocation will be done in the next chapter. When an optimal asset allocation is selected, this allocation is used in all succeeding simulation runs to examine the three scenarios mentioned earlier in the chapter. While the optimal portfolio may be determined through simulation runs in any of the three scenarios, Scenario 2 will be used for convenience.

In this chapter, the creation of the spreadsheet model was discussed. It also discussed the process of determining the optimal asset allocation. Simulation runs were made in the determination of the optimal asset allocation, and in the three scenarios, which used this optimal allocation. The next chapter will discuss the analysis of these simulation results. It will also discuss how the optimal asset allocation was selected, and the results of the simulation results explained.

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VI. ANALYSIS OF SIMULATION RESULTS

A. ASSET ALLOCATION RESULTS

In the determination of the optimal portfolio allocation, a simulation run of 5,000 trials was done in each of the 50 different pre-determined allocations. Except for the pre-determined allocation, all other variables remained constant in each run. This is to really determine the effect of the allocation on the year-end fund balance. It must be noted that the allocation for S & L is fixed at 11% because of the PHP 28M investment constraint in S & L. Detailed statistical simulation reports are found in Appendix F while extracts of these reports are shown in Table 14 for easy understanding. Table 15 shows the allocation proportions that have the two highest Year 2001 and Year 2020 Fund Balances.

Allocations	Mean	Std Deviation	Coeff. of Variation	Std. Error of Mean
11: 11%, 30%, 58%, 1%				
2001 Fund Balance	266,034	17,797	0.07	251.69
2020 Fund Balance	386,353	116,703	0.30	1,650.43
Total	**652,387**	**134,500**	**0.37**	**1,902.12**
12: 11%, 31%, 58%, 0%				
2001 Fund Balance	266,102	18,503	0.07	261.67
2020 Fund Balance	385,861	115,704	0.30	1,636.30
Total	**651,963**	**134,207**	**0.37**	**1,897.97**

Table 15. Top 2 Asset Allocations that Have the Highest Fund Balances (in Thousand PHP, except Coeff. of Variation) "From Appendix F"

The above allocation proportions show that T-bills has greater allocation than that of High-cap stocks by a ratio of about 1:1.9. This emphasizes the importance not only of

Mean Returns but also of Standard Deviations in allocating assets in the portfolio. The small standard deviation for T-bills, which means it is less risky, makes it an attractive investment despite its having lesser mean return than that of high-cap stocks. This explains why high year 2001 and year 2020 fund balances always had high allocation for T-bills in the simulation results.

The results also show that although Allocation 12 has slightly higher 2001 Fund Balance, Allocation 11 has higher Total Fund Balance of PHP 652,387 compared to Allocation 12's PHP 651,963. Both Allocations have the same Total Coefficient of Variation of 0.37. Allocation 12 has slightly smaller Standard Deviation of 134,207 when compared to Allocation 11, which has 134,500. Likewise, Allocation 12 has a slightly smaller Standard Error of the Mean of 1,897.97 when compared to Allocation 11, which has 1,902.12. These differences in Standard Deviation and Standard Error of the Mean, however, are so small as to affect the returns in the allocation of assets. With all these considerations, Allocation 11 is then a better choice than Allocation 12. Therefore, the Optimal Asset Allocation is Allocation 11, which consists of 11% Capital Contribution S & L, 30% High-cap Stocks, 58% T-bills, and 1% T-bonds. Besides, Allocation 11 fits the desire of the AFPPTF management of investing in all four assets of the portfolio. This desire will not materialize if Allocation 12 is selected since it has 0% allocation in T-bonds.

B. SCENARIO # 1 RESULTS

The allocation of 11% Capital Contribution S & L, 30% High-cap Stocks, 58% T-bills, and 1% T-bonds, the Optimal Asset Allocation, is the allocation used for the model

for all of the simulation runs, for all the three scenarios. The objective of examining these scenarios is to demonstrate the use of the model to examine the effect on portfolio returns of varying variables in the model. The three scenarios display the effect of differing assumptions concerning two variables: Expenditures and Operating Expenses.

1. Forecast Results

In this scenario, the yearly rate of change of scholarship and operating expenses were based the historic rate of increase from past expenditure patterns of AFPPTF. The mean or average of yearly change based on historical figures for scholarship expenses is 22.62% and 10.04% for operating expenses. If AFPPTF management continues its current expenditure patterns i.e., increasing scholarship expenses by 22.62% and operating expenses by 10.04% yearly, the forecast results, as extracted from the simulation report in Appendix J, are as follows:

a. Average Portfolio Return

Mean - 17%
Standard Deviation - 2%

b. 2001 Fund Balance

Mean - PHP 265.96M
Standard Deviation - PHP 18.07M

c. 2020 Fund Balance

Mean - (PHP 34,204.70M)
Standard deviation - PHP 97,085.80M

The above figures are the simulation results of the forecasts earlier identified in the model. Of particular significance in the above results is the year 2020 forecast which has a Mean Fund Balance of negative PHP 34,204.70M and a very large standard

deviation of PHP 97,085.70M. These suggest that the investment returns in the scenario are not enough to cover the expenses over periods of time. Likewise, if we look at the yearly fund balances in the Scenario #1 Worksheet (Appendix G), we will see that AFPPTF will have a mean fund balance of PHP 22.45M in 2010. In the succeeding year, however, it starts to have yearly negative mean fund balances. The fund balance at year ending 2011 is negative PHP 161.59M. All these post-simulation yearly fund balances are not found in the simulation reports in Appendix J, because Monte Carlo only prints out simulation reports for the designated forecasts. The values of the other year fund balances not designated as forecasts but which are state variables in the model are found in the simulation worksheet (Appendix G) itself.

The results showed that Scenario # 1 is not a good choice. AFPPTF management should therefore alter their current expenditure patterns and consider reducing the rate of increase in yearly scholarship and operating expenses.

2. "What-if" Analysis

This type of analysis shows one advantage of the Monte Carlo simulation method. To illustrate this analysis, we will assume that AFPPTF would like to know the probability or the certainty of attaining, say, Average Portfolio Return of at least 18%, or 2001 and 2020 Mean Fund Balance of at least PHP 250M for any of the Scenarios in the model or for any scenario for that matter. The "what-if" analysis can be started by manipulating the triangle-shaped "end-point grabbers" in any of the forecast probability charts, after a simulation run. For the probability of attaining an Average Portfolio Return of 18%, simply point the mouse pointer to the left-side "end-point grabber" and drag it

along the x-axis of the chart and align it to 18%. The probability result can then be read directly in the rectangular box provided below the chart.

For Scenario # 1, the probability of attaining at least 18% Average Portfolio Return is 26.84%. AFPPTF management can then evaluate this probability result before making decisions. The probability result shows that although the Average Portfolio Return in the scenario is 17%, there is only a 26.84% chance of attaining 18% average portfolio return. The same process is followed in determining the probability for either 2001 or 2020 Mean Fund Balance. The probability of attaining a Fund Balance of PHP 250M in year 2001 is 81.28%. The probability of attaining a Fund Balance of PHP 250M in year 2020 cannot be determined in this Scenario since it has a negative Fund Balance in 2020. This probability can be determined, however, in Scenario # 2 and Scenario # 3. Again, the probability result under Fund Balance must be evaluated by AFPPTF before making decisions.

C. SCENARIO # 2 RESULTS

1. Forecast Results

This scenario involved the use of inflation rate in determining yearly increases in operating expenditures and the use of the policy formula in determining yearly increases in scholarship expenditures. As mentioned earlier, the policy formula, though never implemented, requires that the amount of scholarship expenditure for a given year should be equal to all the earnings plus one-half of the experience refunds for the preceding year. This scenario shows that the AFPPTF will have clear visibility of the effects on future

fund balances of the policy formula and inflation rate yearly changes. The forecast results, which are extracted from the simulation report in Appendix K, are as follows:

a. Average Portfolio Return

   Mean - 17%
   Standard Deviation - 2%

b. 2001 Fund Balance

   Mean - PHP 265.92M
   Standard Deviation - PHP 18.08M

c. 2020 Fund Balance

   Mean - PHP 383.87M
   Standard deviation - PHP 117.79M

This Scenario is better than Scenario # 1. Average Portfolio Returns, Mean and Standard Deviation, are the same at 17% and 2%, respectively. Note that the mean and standard deviation of returns must be approximately the same in each scenario, because all scenarios use the same portfolio proportions and the assumed rate of return for each asset class. However, this scenario has a positive year 2020 fund balance of PHP 383.87M. It can, therefore, sustain its scholarship and operating expenses, given its average portfolio return of 17%.

2. "What-if" Analysis

The probability of attaining at least 18% Average Portfolio Return for this Scenario is 26.52%. This is slightly lower than the return for Scenario # 1. There is an 80.26% probability of attaining at least PHP 250M in year 2001. The probability of attaining at least PHP 250M for year 2020 is 86.64%.

D. SCENARIO # 3 RESULTS

1. Forecast Results

This scenario involved the use of inflation rate in both the yearly changes in scholarship and operating expenditures. The scenario will bring about positive increase in yearly fund balances because the yearly portfolio return is higher than the inflation rate. The forecast results, which are extracted from the simulation report in Appendix L, are as follows:

a. Average Portfolio Return

Mean - 17%
Standard Deviation - 2%

d. 2001 Fund Balance

Mean - PHP 265.99M
Standard Deviation - PHP 18.18M

e. 2020 Fund Balance

Mean - PHP 762.17M
Standard deviation - PHP 1,988.89M

The Mean and Standard Deviation of the Average Portfolio Return and 2001 Fund Balance for this Scenario is, again, the same as those of Scenario # 1 and Scenario # 2. However, it has a big Mean Fund Balance of PHP 762.17M and a big Standard Deviation of PHP 1,988.89M for year 2020. Generating big fund balances over the years in this Scenario is the result of assuming management of the AFPPTF will control the rate of increase in scholarship and operating expenses to the inflation rate.

2. "What-if" Analysis

The probability of attaining at least 18% Average Portfolio Return for this Scenario is 26.66%. There is an 80.88% probability of attaining at least PHP 250M in year 2001, which is between the probability for Scenario # 1 and Scenario # 2. There is also a 60.02% probability of attaining at least PHP 250M for year 2020.

E. SUMMARY OF FINDINGS

The simulation results just discussed in this chapter show the different Mean returns and Standard Deviations in the three different Scenarios. These results demonstrate the usefulness of the model in examining the impact of changing variables in the model. These results also help the management of AFPPTF make operational or financial decisions concerning AFPPTF investments, and craft policies or decisions on scholarship and operating expenses. Also, by undertaking "what-if" analysis, AFPPTF management, by knowing the probability of attaining a certain desired result, can tailor their financial decisions to their tolerance for risks.

Based on the forecast results, AFPPTF management may choose one from among the three Scenarios, which fit their plans or objectives. If AFPPTF management wants big Fund Balances over the years, then they must select Scenario # 3, where scholarship and operating expenses are moderate. However, if they want to maximize the number of scholarship beneficiaries and/or the amount of benefits per beneficiary, without totally depleting the Fund over the years, they must choose Scenario # 2. AFPPTF management should avoid Scenario # 1 especially if they want the AFPPTF to exist for more than ten years. This Scenario will have negative Fund Balances in year 2011 onwards. Since this

Scenario is based on the current scholarship and operating expense patterns of AFPPTF, management should act at once and consider revising their yearly expenditures.

It must be emphasized that AFPPTF may or may not choose any of the Scenarios in this research. These Scenarios were used to illustrate some of the possible options that are available to them especially in planning for their yearly scholarship and operating expenses.

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VII. CONCLUSION AND RECOMMENDATION

A. CONCLUSION

The objective of this thesis research was to create a model designed to analyze investment asset allocation considering optimal investment returns, which can be used by the management of the AFPPTF as a financial planning tool. The methodology of the research consisted of two broad steps namely, data collection and model construction and analysis. Data collection consisted primarily of literature review, archival research, and interviews. Analysis involved Monte Carlo simulation.

The objective of the thesis research was accomplished. A model was created, in Microsoft Excel spreadsheet, where various variables of the model were inter-related by equations and formulas. The highlights and focuses on the yearly inflows and outflows of the AFPPTF. Expected risks and returns may be determined by varying certain variables in the model to amounts or values that correspond to operational or financial decisions of the management of AFPPTF. The expected risks and returns are shown over a period of 20 years in the model thereby allowing the management of AFPPTF clear visibility of these risks and returns, which are necessary before making decisions.

The model incorporates an optimal allocation of four assets, namely, Capital Contribution S & L, High-cap Stocks, T-bills, and T-bonds, in the portfolio. This optimal asset allocation was determined in the research through initial judgment concerning relative risks and historical returns of the different assets and additionally through successive simulation runs using the Monte Carlo method. Each run had different asset allocation. The allocation that resulted in the highest return and with the least risk was

selected as the optimal allocation. After determination of the optimal asset allocation, the model was used to examine three scenarios. The objective of examining the three scenarios is to demonstrate the use of the model to analyze the effect on portfolio returns of varying variables in the model. The three scenarios display the effect of differing assumptions concerning two variables: Scholarship and Operating Expenses. These scenarios illustrate some of the policy or decision options available to AFPPTF management. As the simulation results in the three scenarios show, controlling the rate of increase of Scholarship and Operating Expenses will greatly influence the amount of Fund Balances over the years.

B. RECOMMENDATION

1. Recommendations for AFPPTF Management

a. The management of AFPPTF should adopt the optimal asset allocation developed in this research, should they eventually decide to invest in their planned portfolio. The optimal asset allocation, arrived at after successive simulation runs, is expected to bring the highest investment return and with the least risk in the portfolio, as the simulation results showed.

b. The management of AFPPTF should immediately revise their current yearly scholarship and operating expenditure patterns, once they are forced to pull out their bulk investments at the four savings and loan associations and transfer the investments to their planned portfolio. As Scenario # 1 showed in the research, increasing the yearly scholarship and operating expenses based on past expenditure patterns of the

AFPPTF will mean depletion of the Trust Fund in 11 years, i. e., in year 2011. One alternative is to increase the scholarship and operating expenses yearly based on inflation rate, as was the case in Scenario # 3, which resulted in large fund balances over the years. Another alternative is to increase the operating expenses based on inflation rate and increase the scholarship expenses based on a policy formula, as was the case in Scenario # 2, which resulted in moderate yearly Trust Fund growth but with increased amount of benefits and number of scholarship beneficiaries. These are only two of the many alternatives that are available.

2. Recommendations For Future Research

a. Research may be undertaken in the future to create a model for the AFPPTF, this time incorporating market correlation or covariance in measuring risks in the portfolio. This will result in a more reliable measurement of risk for each of the assets in the portfolio and to the portfolio as a whole.

b. Using the same concept and the same process in the research, a thesis research may be undertaken in the future to create a similar model for each of the individual Program Funds, i.e., AFP Pers, CAFGUAA, and RA 6963, of the AFPPTF. This will be helpful in tracking the risks and returns of each of the individual program funds, which are important in managing these individual program funds.

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APPENDIX A

Historical Rates and Returns (Stocks, S & L, Inflation)

(In %)

High-cap Stocks "From Ref. 14"

Year	Return
1969	34.22
1970	29.43
1971	13.33
1972	-12.44
1973	-23.86
1974	-36.72
1975	45.55
1976	24.45
1977	43.88
1078	24.65
1979	20.75
1980	27.87
1981	16.56
1982	21.21
1983	-11.75
1984	-23.57
1985	-17.67
1986	11.24
1987	23.68
1988	32.87
1989	12.99
1990	18.75
1991	23.12
1992	33.76
1993	33.87
1994	41.54
1995	39.83
1996	40.5
1997	-34.87
1998	22.56
1999	29.43
Mean	**16.30**
Std Dev	**23.70**

Savings and Loan Assn "From Ref. 15"

	AFPSLAI	*AMWSLAI*	*CWSLAI*	*ACDI*
1990	22.10	23.21	22.30	21.00
1991	24.32	23.21	22.50	21.00
1992	22.66	23.21	22.70	21.00
1993	21.00	23.21	22.70	21.00
1994	21.00	23.21	23.00	21.00
1995	21.00	23.21	23.50	21.00
1996	21.00	23.21	23.50	21.00
1997	21.00	23.21	23.20	21.00
1998	21.55	23.21	23.20	21.00
1999	22.10	23.21	23.20	21.00
Mean		**22.24**		
Std Dev		**1.07**		

Inflation Rates "From Ref. 16"

1985	5.20
1986	9.80
1987	7.60
1988	5.90
1989	10.10
1990	13.20
1991	18.50
1992	8.60
1993	6.90
1994	8.40
1995	8.00
1996	9.00
1997	5.90
1998	9.70
1999	6.80
Mean	**8.91**
Std Dev	**3.34**

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APPENDIX B

Historical Returns of Government Securities, "From Ref. 6"

(Weighted Average Interest Rates, in %)

Treasury Bills

Year	*% Return*
1979	12.84
1980	13.25
1981	15.67
1982	14.22
1983	16.77
1984	27.25
1985	20.57
1986	16.08
1987	11.39
1988	14.46
1989	18.68
1990	23.67
1991	21.63
1992	15.94
1993	12.64
1994	12.68
1995	11.95
1996	12.34
1997	13.12
1998	15
1999	9.99
Mean	**15.72**
Std Dev	**4.39**

Treasury Bonds

Year	*% Return*
1980	12.50
1981	14.63
1982	14.25
1983	12.25
1984	14.00
1985	13.50
1986	11.88
1987	14.13
1988	13.50
1989	12.00
1990	13.00
1991	14.13
1992	11.75
1993	12.75
1994	13.88
1995	11.63
1996	14.75
1997	13.75
1998	14.88
1999	14.13
Mean	**13.36**
Std Dev	**1.06**

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APPENDIX C

Yearly Increase of Scholarship and Operating Expenses

		Inflows			Outflows			Total		
	Experience Refund	Earnings	Donations	Total	Scholar-ship	Operations	Total	Net Cash Flow	Yearly Incr Schol. Exp	Yearly Incr Optg Exp
1985	12.607	1.548		14.155		0.325	0.325	13.830		
1986	3.222	3.055		6.277	0.574	0.231	0.805	5.472		***-40.69%***
1987	0.978	2.380		3.358	0.705	0.348	1.053	2.305	***18.58%***	***33.62%***
1988	0.907	5.595		6.502	1.471	0.349	1.820	4.682	***52.07%***	***0.29%***
1989	1.600	5.076		6.676	2.435	0.345	2.780	3.896	***39.59%***	***-1.16%***
1990	1.595	6.516		8.111	2.859	0.323	3.182	4.929	***14.83%***	***-6.81%***
1991	2.636	8.826		11.462	3.367	0.710	4.077	7.385	***15.09%***	***54.51%***
1992	1.251	8.920		10.171	3.665	0.625	4.290	5.881	***8.13%***	***-13.60%***
1993	22.412	9.909		32.321	4.401	1.300	5.701	26.620	***16.72%***	***51.92%***
1994	5.220	13.364		18.584	6.488	2.019	8.507	10.077	***32.17%***	***35.61%***
1995	11.866	15.387	3.393	30.646	6.694	2.248	8.942	21.704	***3.08%***	***10.19%***
1996	7.578	19.942	3.000	30.520	8.134	1.795	9.929	20.591	***17.70%***	***-25.24%***
1997	8.314	23.811	1.000	33.125	10.084	2.391	12.475	20.650	***19.34%***	***24.93%***
1998	36.018	31.012	1.000	68.030	15.677	2.377	18.054	49.976	***35.68%***	***-0.59%***
1999	8.020	30.764	2.112	40.896	19.861	2.884	22.745	18.151	***21.07%***	***17.58%***
Total	124.224	186.105	10.505	320.834	86.415	18.270	104.685	216.149		
Avg	***8.282***	***12.407***	***2.101***	***21.389***	***6.173***	***1.218***	***6.979***	***14.410***	***22.62%***	***10.04%***
Std Dev	***9.690***	***9.826***	***1.107***	***17.798***	***5.703***	***0.963***	***6.600***	***12.596***	***13.59%***	***28.03%***
Exp Refund + Donation:										
Mean	***8.982***									
Std Dev	***10.031***									

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APPENDIX D

AFPPTF Total Experience Refunds & Donations

(in Million PHP)

	Experience Refund	Donations	Total
1985	12.607		12.607
1986	3.222		3.222
1987	0.978		0.978
1988	0.907		0.907
1989	1.600		1.600
1990	1.595		1.595
1991	2.636		2.636
1992	1.251		1.251
1993	22.412		22.412
1994	5.220		5.220
1995	11.866	3.393	15.259
1996	7.578	3.000	10.578
1997	8.314	1.000	9.314
1998	36.018	1.000	37.018
1999	8.020	2.112	10.132
Total	124.224	10.505	134.729
Mean			**8.982**
Std Dev			**10.031**

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APPENDIX E

AFPPTF Spreadsheet Model

Note: Deterministic results based on Scenario # 1 and all all variables set to historical mean.
Figures in Thousand Philippine Pesos(PHP).

				Yearly							
		Mean	Std Dev	Change				Color Codes:			
Init. Investment	253,715								State Variables		
Init.Schol. Exp	24,354	22.62%	13.59%	22.62%					Decision Variables		
Init. Optg Exp	3,174	10.04%	28.03%	10.04%					Forecasts		
Inflation Rate		8.91%	3.34%	8.91%					Decision or Envir. Variables		
Exp Refund		8,982	10,031	8,982							
Portfolio	Allocation										
Cap Cont, S & L	11%	22.24%	1.07%								
Hi-Cap Stocks	30%	16.30%	23.70%								
T - Bills	55%	15.72%	4.39%								
T - Bonds	4%	13.36%	1.06%								
S & L Constraint	28,000	(4 X PHP 7,000)									
	Beginning	Portfolio	Scholarship	Optg	Earnings	Ending		CC S & L	High cap	T-Bills	T- Bonds
Year	Balance	Return	Exp	Exp		Balance		Return	Return	Return	Return
2001	253,715	16.52%	24,354	3,174	39,632	265,819		22.24%	16.30%	15.72%	13.36%
2002	274,801	16.52%	29,863	3,493	43,089	284,534		22.24%	16.30%	15.72%	13.36%
2003	284,534	16.52%	36,618	3,843	44,212	288,286		22.24%	16.30%	15.72%	13.36%
2004	288,286	16.52%	44,901	4,229	44,242	283,398		22.24%	16.30%	15.72%	13.36%
2005	283,398	16.52%	55,057	4,654	42,716	266,402		22.24%	16.30%	15.72%	13.36%
2006	266,402	16.52%	67,511	5,121	39,031	232,801		22.24%	16.30%	15.72%	13.36%
2007	232,801	16.52%	82,782	5,635	32,411	176,794		22.24%	16.30%	15.72%	13.36%
2008	176,794	16.52%	101,508	6,201	21,852	90,938		22.24%	16.30%	15.72%	13.36%
2009	90,938	16.52%	124,469	6,824	6,074	(34,281)		22.24%	16.30%	15.72%	13.36%
2010	(34,281)	16.52%	152,624	7,509	(16,561)	(210,975)		22.24%	16.30%	15.72%	13.36%
2011	(210,975)	16.52%	187,147	8,263	(48,133)	(454,518)		22.24%	16.30%	15.72%	13.36%
2012	(454,518)	16.52%	229,480	9,092	(91,278)	(784,368)		22.24%	16.30%	15.72%	13.36%
2013	(784,368)	16.52%	281,388	10,005	(149,330)	(1,225,091)		22.24%	16.30%	15.72%	13.36%
2014	(1,225,091)	16.52%	345,038	11,009	(226,493)	(1,807,632)		22.24%	16.30%	15.72%	13.36%
2015	(1,807,632)	16.52%	423,086	12,115	(328,058)	(2,570,891)		22.24%	16.30%	15.72%	13.36%
2016	(2,570,891)	16.52%	518,788	13,331	(460,670)	(3,563,680)		22.24%	16.30%	15.72%	13.36%
2017	(3,563,680)	16.52%	636,138	14,670	(632,661)	(4,847,149)		22.24%	16.30%	15.72%	13.36%
2018	(4,847,149)	16.52%	780,032	16,142	(854,462)	(6,497,785)		22.24%	16.30%	15.72%	13.36%
2019	(6,497,785)	16.52%	956,476	17,763	(1,139,111)	(8,611,135)		22.24%	16.30%	15.72%	13.36%
2020	(8,611,135)	16.52%	1,172,830	19,546	(1,502,888)	(11,306,400)		22.24%	16.30%	15.72%	13.36%
Avg Portfolio Return		16.52%									

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APPENDIX F

Asset Allocation Simulation
Crystal Ball Report
Simulation started on 11/15/00 at 20:35:41
Simulation stopped on 11/15/00 at 20:36:26

ALLOCATION 1: 11%, 35%, 50%, 4%

Forecast: 2001 Balance **Cell: G26**

Summary:
Display Range is from 210,000 to 330,000 PHP
Entire Range is from 198,207 to 353,573 PHP
After 5,000 Trials, the Std. Error of the Mean is 296

Statistics:	Value
Trials	5000
Mean	265,589
Median	265,526
Mode	—
Standard Deviation	20,948
Variance	438,835,524
Skewness	0.06
Kurtosis	3.04
Coeff. of Variability	0.08
Range Minimum	198,207
Range Maximum	353,573
Range Width	155,366
Mean Std. Error	296.26

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -9,642 to 842,612 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,647

Statistics:	Value
Trials	5000
Mean	383,913
Median	379,880
Mode	—
Standard Deviation	116,450
Variance	13,560,696,945
Skewness	0.10
Kurtosis	3.04
Coeff. of Variability	0.30
Range Minimum	-9,642
Range Maximum	842,612
Range Width	852,253
Mean Std. Error	1,646.86

ALLOCATION 2: 11%, 30%, 55%, 4%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 203,773 to 333,250 PHP
After 5,000 Trials, the Std. Error of the Mean is 254

Statistics:	Value
Trials	5000
Mean	265,734
Median	265,875
Mode	—
Standard Deviation	17,941
Variance	321,872,842
Skewness	0.00
Kurtosis	2.95
Coeff. of Variability	0.07
Range Minimum	203,773
Range Maximum	333,250
Range Width	129,477
Mean Std. Error	253.72

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -35,939 to 940,135 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,700

Statistics:	Value
Trials	5000
Mean	384,442
Median	384,179
Mode	—
Standard Deviation	120,189
Variance	14,445,411,447
Skewness	0.09
Kurtosis	3.01
Coeff. of Variability	0.31
Range Minimum	-35,939
Range Maximum	940,135
Range Width	976,074
Mean Std. Error	1,699.73

ALLOCATION 3: 11%, 30%, 50%, 9%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 199,009 to 331,306 PHP
After 5,000 Trials, the Std. Error of the Mean is 254

Statistics:	Value
Trials	5000
Mean	265,338
Median	265,077
Mode	—
Standard Deviation	17,941
Variance	321,862,031
Skewness	0.06
Kurtosis	3.07
Coeff. of Variability	0.07
Range Minimum	199,009
Range Maximum	331,306
Range Width	132,297
Mean Std. Error	253.72

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from 3,428 to 856,113 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,641

Statistics:	Value
Trials	5000
Mean	381,930
Median	380,248
Mode	—
Standard Deviation	116,035
Variance	13,464,140,685
Skewness	0.12
Kurtosis	3.10
Coeff. of Variability	0.30
Range Minimum	3,428
Range Maximum	856,113
Range Width	852,686
Mean Std. Error	1,640.98

ALLOCATION 4: 11%, 30%, 45%, 14%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 191,733 to 326,021 PHP
After 5,000 Trials, the Std. Error of the Mean is 253

Statistics:	Value
Trials	5000
Mean	265,273
Median	265,359
Mode	—
Standard Deviation	17,894
Variance	320,183,790
Skewness	-0.02
Kurtosis	3.04
Coeff. of Variability	0.07
Range Minimum	191,733
Range Maximum	326,021
Range Width	134,288
Mean Std. Error	253.05

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -6,945 to 883,992 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,658

Statistics:	Value
Trials	5000
Mean	382,729
Median	379,611
Mode	—
Standard Deviation	117,266
Variance	13,751,276,152
Skewness	0.14
Kurtosis	3.01
Coeff. of Variability	0.31
Range Minimum	-6,945
Range Maximum	883,992
Range Width	890,937
Mean Std. Error	1,658.39

ALLOCATION 5: 11%, 25%, 50%, 14%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 220,000 to 310,000 PHP
Entire Range is from 197,544 to 321,073 PHP
After 5,000 Trials, the Std. Error of the Mean is 216

Statistics:	Value
Trials	5000
Mean	265,434
Median	265,521
Mode	—
Standard Deviation	15,267
Variance	233,084,170
Skewness	-0.03
Kurtosis	3.02
Coeff. of Variability	0.06
Range Minimum	197,544
Range Maximum	321,073
Range Width	123,529
Mean Std. Error	215.91

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -1,490 to 814,601 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,629

Statistics:	Value
Trials	5000
Mean	380,215
Median	378,361
Mode	—
Standard Deviation	115,157
Variance	13,261,168,275
Skewness	0.06
Kurtosis	3.02
Coeff. of Variability	0.30
Range Minimum	-1,490
Range Maximum	814,601
Range Width	816,091
Mean Std. Error	1,628.57

ALLOCATION 6: 11%, 35%, 45%, 9%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 330,000 PHP
Entire Range is from 186,519 to 340,494 PHP
After 5,000 Trials, the Std. Error of the Mean is 298

Statistics:	Value
Trials	5000
Mean	265,297
Median	265,261
Mode	—
Standard Deviation	21,048
Variance	442,998,642
Skewness	-0.04
Kurtosis	3.06
Coeff. of Variability	0.08
Range Minimum	186,519
Range Maximum	340,494
Range Width	153,975
Mean Std. Error	297.66

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -55,120 to 926,734 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,653

Statistics:	Value
Trials	5000
Mean	385,307
Median	382,267
Mode	—
Standard Deviation	116,910
Variance	13,667,909,721
Skewness	0.15
Kurtosis	3.17
Coeff. of Variability	0.30
Range Minimum	-55,120
Range Maximum	926,734
Range Width	981,854
Mean Std. Error	1,653.35

ALLOCATION 7: 11%, 40%, 45%, 4%

Forecast: 2001 Balance

Summary:
Display Range is from 200,000 to 350,000 PHP
Entire Range is from 182,606 to 350,184 PHP
After 5,000 Trials, the Std. Error of the Mean is 332

Statistics:	Value
Trials	5000
Mean	266,123
Median	265,974
Mode	—
Standard Deviation	23,443
Variance	549,554,052
Skewness	0.03
Kurtosis	3.00
Coeff. of Variability	0.09
Range Minimum	182,606
Range Maximum	350,184
Range Width	167,579
Mean Std. Error	331.53

Forecast: 2020 Balance

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -29,865 to 867,443 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,673

Statistics:	Value
Trials	5000
Mean	383,434
Median	378,483
Mode	—
Standard Deviation	118,315
Variance	13,998,322,460
Skewness	0.13
Kurtosis	3.07
Coeff. of Variability	0.31
Range Minimum	-29,865
Range Maximum	867,443
Range Width	897,308
Mean Std. Error	1,673.22

ALLOCATION 8: 11%, 37%, 45%, 7%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 200,000 to 340,000 PHP
Entire Range is from 170,237 to 340,035 PHP
After 5,000 Trials, the Std. Error of the Mean is 305

Statistics:	Value
Trials	5000
Mean	265,655
Median	265,848
Mode	—
Standard Deviation	21,567
Variance	465,141,961
Skewness	-0.06
Kurtosis	3.03
Coeff. of Variability	0.08
Range Minimum	170,237
Range Maximum	340,035
Range Width	169,798
Mean Std. Error	305.01

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -29,808 to 891,788 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,671

Statistics:	Value
Trials	5000
Mean	384,091
Median	383,656
Mode	—
Standard Deviation	118,126
Variance	13,953,773,711
Skewness	0.11
Kurtosis	3.10
Coeff. of Variability	0.31
Range Minimum	-29,808
Range Maximum	891,788
Range Width	921,596
Mean Std. Error	1,670.56

ALLOCATION 9: 11%, 37%, 48%, 4%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 200,000 to 340,000 PHP
Entire Range is from 189,170 to 346,883 PHP
After 5,000 Trials, the Std. Error of the Mean is 305

Statistics:	Value
Trials	5000
Mean	265,768
Median	265,694
Mode	—
Standard Deviation	21,599
Variance	466,513,186
Skewness	-0.03
Kurtosis	3.02
Coeff. of Variability	0.08
Range Minimum	189,170
Range Maximum	346,883
Range Width	157,713
Mean Std. Error	305.45

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -24,543 to 875,599 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,691

Statistics:	Value
Trials	5000
Mean	380,571
Median	378,257
Mode	—
Standard Deviation	119,602
Variance	14,304,665,492
Skewness	0.14
Kurtosis	3.16
Coeff. of Variability	0.31
Range Minimum	-24,543
Range Maximum	875,599
Range Width	900,142
Mean Std. Error	1,691.43

ALLOCATION 10: 11%, 30%, 57%, 2%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 196,885 to 331,536 PHP
After 5,000 Trials, the Std. Error of the Mean is 258

Statistics:	Value
Trials	5000
Mean	265,932
Median	265,984
Mode	—
Standard Deviation	18,263
Variance	333,553,537
Skewness	-0.02
Kurtosis	2.91
Coeff. of Variability	0.07
Range Minimum	196,885
Range Maximum	331,536
Range Width	134,650
Mean Std. Error	258.28

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from 20,645 to 814,093 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,660

Statistics:	Value
Trials	5000
Mean	385,919
Median	382,910
Mode	—
Standard Deviation	117,350
Variance	13,771,078,511
Skewness	0.14
Kurtosis	2.91
Coeff. of Variability	0.30
Range Minimum	20,645
Range Maximum	814,093
Range Width	793,448
Mean Std. Error	1,659.58

ALLOCATION 11: 11%, 30%, 58%, 1%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 204,117 to 322,767 PHP
After 5,000 Trials, the Std. Error of the Mean is 252

Statistics:	Value
Trials	5000
Mean	266,034
Median	265,801
Mode	—
Standard Deviation	17,797
Variance	316,727,593
Skewness	0.01
Kurtosis	2.89
Coeff. of Variability	0.07
Range Minimum	204,117
Range Maximum	322,767
Range Width	118,650
Mean Std. Error	251.69

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -32,171 to 855,702 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,650

Statistics:	Value
Trials	5000
Mean	386,353
Median	384,294
Mode	—
Standard Deviation	116,703
Variance	13,619,665,978
Skewness	0.14
Kurtosis	3.10
Coeff. of Variability	0.30
Range Minimum	-32,171
Range Maximum	855,702
Range Width	887,873
Mean Std. Error	1,650.43

ALLOCATION 12: 11%, 31%,, 58%, 0%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 199,572 to 337,504 PHP
After 5,000 Trials, the Std. Error of the Mean is 262

Statistics:	Value
Trials	5000
Mean	266,102
Median	265,892
Mode	—
Standard Deviation	18,503
Variance	342,359,882
Skewness	0.03
Kurtosis	3.09
Coeff. of Variability	0.07
Range Minimum	199,572
Range Maximum	337,504
Range Width	137,932
Mean Std. Error	261.67

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -72,613 to 879,914 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,636

Statistics:	Value
Trials	5000
Mean	385,861
Median	383,195
Mode	—
Standard Deviation	115,704
Variance	13,387,410,385
Skewness	0.04
Kurtosis	3.10
Coeff. of Variability	0.30
Range Minimum	-72,613
Range Maximum	879,914
Range Width	952,527
Mean Std. Error	1,636.30

ALLOCATION 13: 11%, 30%, 59%, 0%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 195,779 to 333,290 PHP
After 5,000 Trials, the Std. Error of the Mean is 253

Statistics:	Value
Trials	5000
Mean	266,179
Median	265,897
Mode	—
Standard Deviation	17,877
Variance	319,596,529
Skewness	0.02
Kurtosis	3.18
Coeff. of Variability	0.07
Range Minimum	195,779
Range Maximum	333,290
Range Width	137,510
Mean Std. Error	252.82

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from 4,249 to 908,734 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,621

Statistics:	Value
Trials	5000
Mean	382,638
Median	380,706
Mode	—
Standard Deviation	114,655
Variance	13,145,733,443
Skewness	0.09
Kurtosis	3.05
Coeff. of Variability	0.30
Range Minimum	4,249
Range Maximum	908,734
Range Width	904,485
Mean Std. Error	1,621.46

ALLOCATION 14: 11%, 32%, 57%, 0%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 198,991 to 330,332 PHP
After 5,000 Trials, the Std. Error of the Mean is 269

Statistics:	Value
Trials	5000
Mean	266,471
Median	266,490
Mode	—
Standard Deviation	19,025
Variance	361,945,709
Skewness	-0.02
Kurtosis	2.94
Coeff. of Variability	0.07
Range Minimum	198,991
Range Maximum	330,332
Range Width	131,341
Mean Std. Error	269.05

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -12,906 to 844,299 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,657

Statistics:	Value
Trials	5000
Mean	384,805
Median	382,528
Mode	—
Standard Deviation	117,189
Variance	13,733,193,103
Skewness	0.13
Kurtosis	3.09
Coeff. of Variability	0.30
Range Minimum	-12,906
Range Maximum	844,299
Range Width	857,205
Mean Std. Error	1,657.30

ALLOCATION 15: 11%, 31%, 57%, 1%

Forecast: 2001 Balance

Cell: G26

Summary:
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 197,053 to 331,988 PHP
After 5,000 Trials, the Std. Error of the Mean is 266

Statistics:	Value
Trials	5000
Mean	265,885
Median	266,274
Mode	—
Standard Deviation	18,781
Variance	352,725,764
Skewness	-0.06
Kurtosis	3.03
Coeff. of Variability	0.07
Range Minimum	197,053
Range Maximum	331,988
Range Width	134,935
Mean Std. Error	265.60

Forecast: 2020 Balance

Cell: G45

Summary:
Display Range is from 0 to 700,000 PHP
Entire Range is from -27,211 to 887,735 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,641

Statistics:	Value
Trials	5000
Mean	385,811
Median	385,047
Mode	—
Standard Deviation	116,031
Variance	13,463,284,219
Skewness	0.07
Kurtosis	3.12
Coeff. of Variability	0.30
Range Minimum	-27,211
Range Maximum	887,735
Range Width	914,946
Mean Std. Error	1,640.93

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APPENDIX G

Scenario #1 on Spreadsheet Model

(Scenario: Succeeding Year Scholarship & Optg Expenses @ Historical Values)
Note: Figures in Thousand Philippine Pesos(PHP),
Except Those in %

		Mean	Std Dev	Yearly Change
Init. Investment	253,715			
Init.Schol. Exp	24,354	22.62%	13.69%	22.30%
Init. Optg Exp	3,174	10.04%	28.03%	9.23%
Inflation Rate		-	-	-
Exp Refund		8,982	10,031	8,299

Portfolio	Allocation	Mean	Std Dev
Cash, S & L	11%	22.24%	1.07%
Hi-Cap Stocks	30%	16.30%	23.70%
T - Bills	58%	15.72%	4.39%
T - Bonds	1%	13.36%	1.06%

S & L Constraint	28,000	(4 X PHP 7,000)

Year	Beginning Balance	Portfolio Return	Scholarship Exp	Optg Exp	Earnings	Ending Balance	CashS & L Return	High cap Return	T-Bills Return	T- Bonds Return
2001	253,715	16.57%	24,354	3,174	39,771	265,958	22.22%	16.29%	15.70%	13.35%
2002	274,257	16.54%	29,785	3,467	42,604	287,362	22.25%	16.20%	15.68%	13.38%
2003	295,660	16.50%	36,428	3,787	45,471	305,016	22.23%	15.98%	16.74%	13.36%
2004	313,314	16.57%	44,552	4,137	47,879	316,984	22.25%	16.29%	15.69%	13.35%
2005	325,283	16.75%	54,488	4,519	49,550	320,723	22.23%	16.58%	15.86%	13.38%
2006	329,021	16.58%	66,640	4,936	48,610	311,401	22.24%	16.32%	15.69%	13.35%
2007	319,699	16.47%	81,502	5,392	45,507	284,149	22.27%	16.91%	15.72%	13.36%
2008	292,447	16.57%	99,678	5,890	39,715	232,972	22.26%	16.28%	15.70%	13.34%
2009	241,271	16.70%	121,909	6,433	29,583	149,483	22.23%	16.70%	15.71%	13.37%
2010	157,781	16.54%	149,097	7,027	13,186	22,452	22.24%	16.35%	15.61%	13.36%
2011	30,750	16.53%	182,348	7,676	(10,623)	(161,586)	22.26%	15.98%	15.79%	13.36%
2012	(153,288)	16.61%	223,015	8,385	(44,668)	(420,275)	22.24%	16.53%	15.63%	13.36%
2013	(411,976)	16.54%	272,751	9,159	(91,450)	(775,420)	22.25%	16.99%	15.79%	13.37%
2014	(767,121)	16.60%	333,580	10,005	(155,887)	(1,255,758)	22.22%	16.66%	15.61%	13.36%
2015	(1,247,459)	16.61%	407,974	10,929	(241,932)	(1,896,457)	22.24%	16.48%	15.66%	13.36%
2016	(1,888,159)	16.77%	498,960	11,938	(359,396)	(2,745,514)	22.24%	16.84%	15.75%	13.36%
2017	(2,737,215)	16.57%	610,237	13,040	(505,283)	(3,851,654)	22.23%	16.36%	15.66%	13.37%
2018	(3,843,356)	16.54%	746,331	14,244	(698,522)	(5,287,031)	22.24%	16.15%	15.71%	13.34%
2019	(5,278,733)	16.45%	912,777	15,559	(944,935)	(7,135,165)	22.26%	15.84%	15.72%	13.38%
2020	(7,126,866)	16.49%	1,116,343	16,996	(1,268,934)	(9,510,741)	22.25%	16.26%	15.58%	13.33%
	Avg Port.Rtn	16.58%								

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Scenario # 2 on Spreadsheet Model

(Scenario: Succeeding Year Scholarship Exp. @ Policy Formula; Optg Exp. @ Inflation Rate)
Note: Figures in Thousand Philippine Pesos (PHP), except those in %

				Yearly Change							
		Mean	Std Dev								
Init. Investment	253,715										
Init.Scholarship Exp	24,354			(Policy Formula)							
Init. Optg Exp	3,174			(Inflation Rate)							
Inflation Rate		8.91%	3.34%	9.52%							
Exp Refund		8,982	10,031	8,998							
Portfolio	**Allocation**	**Mean**	**Std Dev**								
Cash, S & L	11%	22.24%	1.07%								
High Cap Stocks	30%	16.30%	23.70%								
Treasury Bills	58%	15.72%	4.39%								
Treasury Bonds	1%	13.36%	1.06%								
S & L Constraint	28,000	(4 x PHP 7,000)									
	Beginning	Portfolio	Scholarship	Optg	Earnings	Ending		S & L	High cap	T- Bills	T - Bonds
Year	Balance	Return	Exp	Exp		Balance		Return	Return	Return	Return
2001	253,715	16.56%	24,354	3,174	39,731	265,918		22.25%	16.33%	15.65%	13.34%
2002	274,916	16.71%	44,230	3,476	41,964	272,941		22.24%	16.59%	15.78%	13.37%
2003	281,939	16.55%	46,463	3,807	42,505	278,296		22.25%	16.41%	15.59%	13.38%
2004	287,294	16.60%	47,004	4,170	43,436	284,072		22.23%	16.51%	15.63%	13.36%
2005	293,070	16.47%	47,935	4,567	43,958	289,469		22.24%	16.01%	15.67%	13.35%
2006	298,467	16.53%	48,457	5,002	44,907	295,331		22.25%	16.03%	15.75%	13.34%
2007	304,329	16.69%	49,406	5,478	46,223	301,602		22.27%	16.84%	15.61%	13.33%
2008	310,600	16.71%	50,722	6,000	47,176	307,556		22.25%	16.61%	15.77%	13.36%
2009	316,554	16.38%	51,675	6,571	47,069	312,486		22.24%	15.77%	15.62%	13.40%
2010	321,484	16.58%	51,568	7,197	48,430	318,943		22.27%	16.36%	15.67%	13.31%
2011	327,941	16.72%	52,929	7,883	49,760	325,431		22.21%	16.80%	15.70%	13.36%
2012	334,429	16.48%	54,259	8,633	49,932	330,813		22.24%	16.03%	15.67%	13.37%
2013	339,811	16.53%	54,431	9,455	50,901	337,063		22.26%	16.13%	15.70%	13.38%
2014	346,061	16.72%	55,400	10,356	52,374	343,901		22.28%	16.70%	15.73%	13.37%
2015	352,899	16.88%	56,873	11,342	53,820	350,804		22.24%	17.09%	15.82%	13.34%
2016	359,802	16.63%	58,319	12,422	53,961	356,477		22.26%	16.36%	15.76%	13.34%
2017	365,475	16.71%	58,461	13,605	55,060	363,211		22.22%	16.74%	15.71%	13.34%
2018	372,209	16.58%	59,559	14,901	55,545	369,431		22.23%	16.26%	15.73%	13.34%
2019	378,429	16.46%	60,044	16,320	56,015	375,743		22.23%	16.06%	15.63%	13.37%
2020	384,741	16.41%	60,514	17,874	56,695	382,389		22.26%	15.78%	15.67%	13.36%
Average Portfolio Return		16.60%									

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APPENDIX I

Scenario # 3 on Spreadsheet Model

(Scenario: Yearly Change in Scholarship & Optg Exp. @ Inflation Rate)
Note: Figures in Thousand Philippine Pesos(PHP),
Except Those in %

		Mean	Std Dev	Yearly Change
Init. Investment	253,715			
Init.Schol. Exp	24,354			(Inflation Rate)
Init. Optg Exp	3,174			(Inflation Rate)
Inflation Rate		8.91%	8.34%	8.84%
Exp Refund		8,282	9,890	8,411

Portfolio	Allocation	Mean	Std Dev
Cash, S & L	11%	22.24%	1.07%
Hi-Cap Stocks	30%	16.30%	23.70%
T - Bills	58%	15.72%	4.39%
T - Bonds	1%	13.36%	1.06%

S & L Constraint 28,000 (4 X PHP 7,000)

Year	Beginning Balance	Portfolio Return	Scholarship Exp	Optg Exp	Earnings	Ending Balance	CashS & L Return	High cap Return	T-Bills Return	T- Bonds Return
2001	253,715	16.59%	24,354	3,174	39,804	265,991	22.22%	16.45%	15.85%	13.36%
2002	274,402	16.48%	26,507	3,455	42,765	290,944	22.22%	15.92%	15.74%	13.35%
2003	299,355	16.60%	28,851	3,760	46,992	317,809	22.23%	16.33%	15.72%	13.36%
2004	326,220	16.54%	31,401	4,092	51,032	346,189	22.26%	16.23%	15.67%	13.33%
2005	354,600	16.84%	34,178	4,454	56,455	377,252	22.24%	17.17%	15.70%	13.36%
2006	385,663	16.54%	37,199	4,848	60,302	409,167	22.25%	16.01%	15.77%	13.35%
2007	417,578	16.76%	40,488	5,277	66,159	443,691	22.23%	16.80%	15.76%	13.38%
2008	452,102	16.62%	44,067	5,743	70,987	479,499	22.26%	16.20%	15.81%	13.34%
2009	487,910	16.57%	47,963	6,251	76,351	516,815	22.26%	16.23%	15.72%	13.35%
2010	525,226	16.62%	52,204	6,804	82,367	555,954	22.25%	16.39%	15.71%	13.36%
2011	564,365	16.57%	56,819	7,405	88,189	596,348	22.24%	16.20%	15.73%	13.38%
2012	604,759	16.68%	61,843	8,060	95,062	638,651	22.22%	16.47%	15.79%	13.37%
2013	647,062	16.40%	67,310	8,772	99,896	680,367	22.24%	15.81%	15.65%	13.36%
2014	688,778	16.69%	73,261	9,548	108,025	724,339	22.21%	16.74%	15.87%	13.32%
2015	732,750	16.60%	79,738	10,392	114,176	768,051	22.23%	16.26%	15.77%	13.34%
2016	776,462	16.55%	86,788	11,311	120,388	810,998	22.24%	16.20%	15.70%	13.38%
2017	819,409	16.61%	94,461	12,311	127,233	853,203	22.23%	16.24%	15.79%	13.35%
2018	861,614	16.72%	102,812	13,399	134,384	894,306	22.25%	16.89%	15.84%	13.38%
2019	902,717	16.66%	111,902	14,584	139,877	931,907	22.24%	16.47%	15.76%	13.40%
2020	940,318	16.51%	121,795	15,873	143,900	963,734	22.25%	15.98%	15.75%	13.36%

Avg Portfolio Return 16.61%

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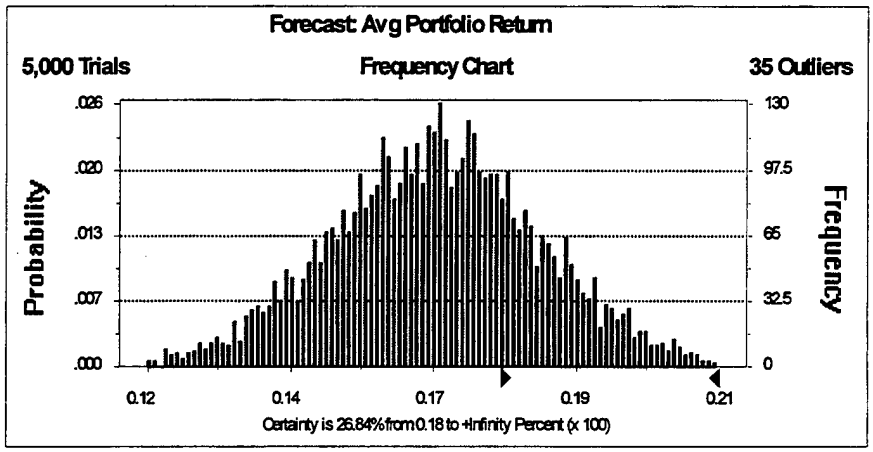
APPENDIX J

Scenario # 1
Crystal Ball Report
Simulation started on 11/19/00 at 22:42:46
Simulation stopped on 11/19/00 at 22:43:42

Forecast: Avg Portfolio Return **Cell: C47**

Summary:
Certainty Level is 26.84%
Certainty Range is from 0.18 to +Infinity Percent (x 100)
Display Range is from 0.12 to 0.21 Percent (x 100)
Entire Range is from 0.10 to 0.23 Percent (x 100)
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.17
Median	0.17
Mode	—
Standard Deviation	0.02
Variance	0.00
Skewness	0.03
Kurtosis	3.06
Coeff. of Variability	0.10
Range Minimum	0.10
Range Maximum	0.23
Range Width	0.13
Mean Std. Error	0.00



Forecast: Avg Portfolio Return (cont'd) **Cell: C47**

Percentiles:

Percentile	Percent (x 100)
0%	0.10
25%	0.15
50%	0.17
75%	0.18
100%	0.23

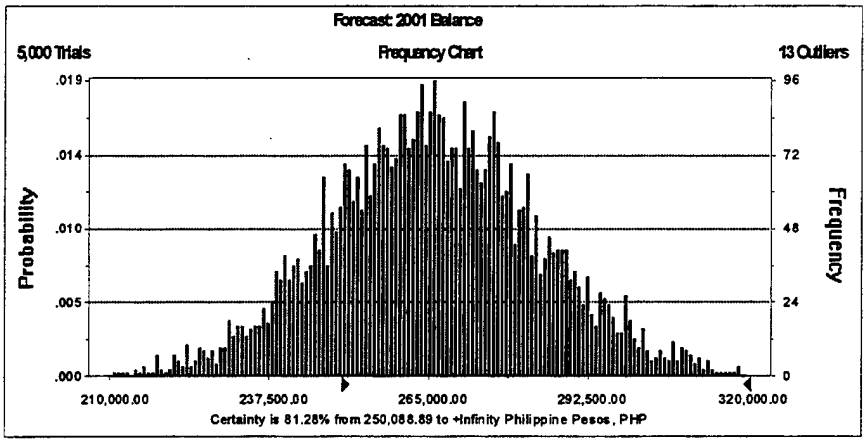
End of Forecast

Forecast: 2001 Balance **Cell: G26**

Summary:

Certainty Level is 81.28%
Certainty Range is from 250,088.89 to +Infinity Philippine Pesos, PHP
Display Range is from 210,000.00 to 320,000.00 Philippine Pesos, PHP
Entire Range is from 200,398.10 to 330,452.01 Philippine Pesos, PHP
After 5,000 Trials, the Std. Error of the Mean is 255.55

Statistics:	Value
Trials	5000
Mean	265,958.09
Median	265,725.71
Mode	---
Standard Deviation	18,070.06
Variance	326,527,248.71
Skewness	0.04
Kurtosis	3.02
Coeff. of Variability	0.07
Range Minimum	200,398.10
Range Maximum	330,452.01
Range Width	130,053.92
Mean Std. Error	255.55



Forecast: 2001 Balance (cont'd) **Cell: G26**

Percentiles:

Percentile	Philippine Pesos, PHP
0%	200,398.10
25%	253,835.71
50%	265,725.71
75%	277,700.83
100%	330,452.01

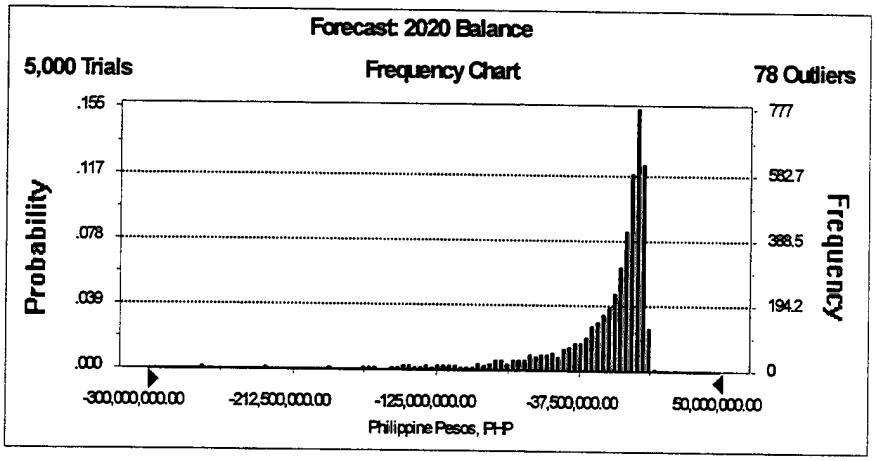
End of Forecast

Forecast: 2020 Balance **Cell: G45**

Summary:

Display Range is from -300,000,000.00 to 50,000,000.00 Philippine Pesos, PHP
Entire Range is from -2,734,928,662.04 to 10,261,580.95 Philippine Pesos, PHP
After 5,000 Trials, the Std. Error of the Mean is 1,373,000.73

Statistics:	Value
Trials	5000
Mean	-34,204,708.64
Median	-9,279,882.28
Mode	—
Standard Deviation	97,085,812.76
Variance	9.43E+15
Skewness	-11.87
Kurtosis	235.92
Coeff. of Variability	-2.84
Range Minimum	-2,734,928,662.04
Range Maximum	10,261,580.95
Range Width	2,745,190,242.99
Mean Std. Error	1,373,000.73



Forecast: 2020 Balance (cont'd) **Cell: G45**

Percentiles:

Percentile	Philippine Pesos, PHP
0%	-2,734,928,662.04
25%	-32,283,846.38
50%	-9,279,882.28
75%	-1,196,426.19
100%	10,261,580.95

End of Forecast

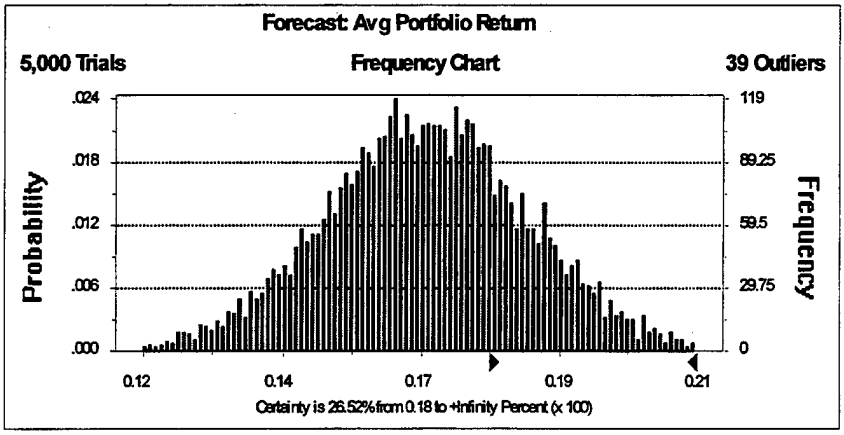
APPENDIX K

Scenario # 2
Crystal Ball Report
Simulation started on 11/19/00 at 22:50:10
Simulation stopped on 11/19/00 at 22:50:57

Forecast: Avg Portfolio Return **Cell: C47**

Summary:
Certainty Level is 26.52%
Certainty Range is from 0.18 to +Infinity Percent (x 100)
Display Range is from 0.12 to 0.21 Percent (x 100)
Entire Range is from 0.11 to 0.23 Percent (x 100)
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.17
Median	0.17
Mode	—
Standard Deviation	0.02
Variance	0.00
Skewness	-0.01
Kurtosis	3.02
Coeff. of Variability	0.10
Range Minimum	0.11
Range Maximum	0.23
Range Width	0.12
Mean Std. Error	0.00



Forecast: Avg Portfolio Return (cont'd) **Cell: C47**

Percentiles:

Percentile	Percent (x 100)
0%	0.11
25%	0.15
50%	0.17
75%	0.18
100%	0.23

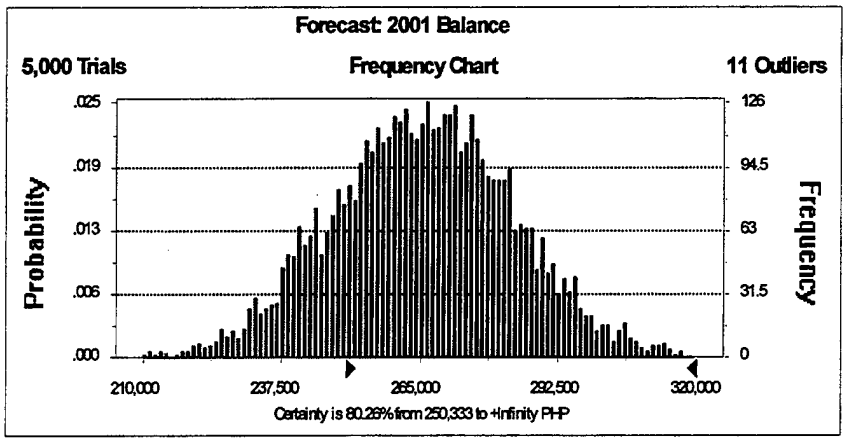
End of Forecast

Forecast: 2001 Balance **Cell: G26**

Summary:

Certainty Level is 80.26%
Certainty Range is from 250,333 to +Infinity PHP
Display Range is from 210,000 to 320,000 PHP
Entire Range is from 201,886 to 335,329 PHP
After 5,000 Trials, the Std. Error of the Mean is 256

Statistics:	Value
Trials	5000
Mean	265,918
Median	266,077
Mode	—
Standard Deviation	18,077
Variance	326,781,829
Skewness	0.00
Kurtosis	2.96
Coeff. of Variability	0.07
Range Minimum	201,886
Range Maximum	335,329
Range Width	133,443
Mean Std. Error	255.65



Forecast: 2001 Balance (cont'd) **Cell: G26**

Percentiles:

Percentile	PHP
0%	201,886
25%	253,813
50%	266,077
75%	278,148
100%	335,329

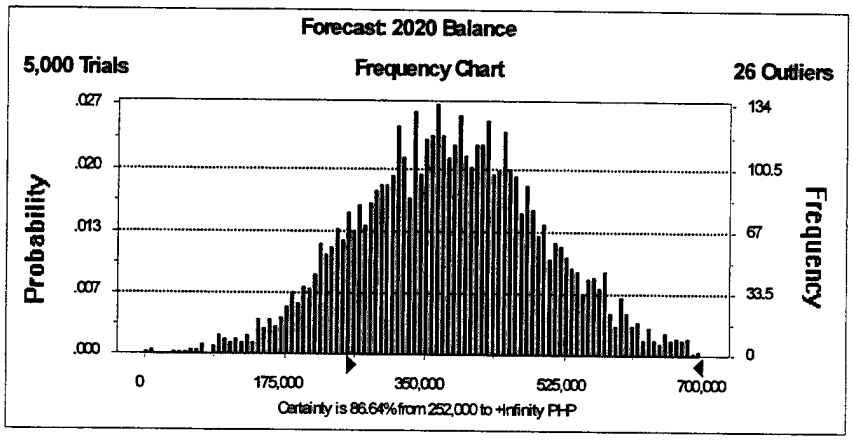
End of Forecast

Forecast: 2020 Balance **Cell: G45**

Summary:

Certainty Level is 86.64%
Certainty Range is from 252,000 to +Infinity PHP
Display Range is from 0 to 700,000 PHP
Entire Range is from -71,669 to 852,090 PHP
After 5,000 Trials, the Std. Error of the Mean is 1,666

Statistics:	Value
Trials	5000
Mean	383,865
Median	381,945
Mode	---
Standard Deviation	117,778
Variance	13,871,714,556
Skewness	0.11
Kurtosis	3.04
Coeff. of Variability	0.31
Range Minimum	-71,669
Range Maximum	852,090
Range Width	923,758
Mean Std. Error	1,665.64



Forecast: 2020 Balance (cont'd) **Cell: G45**

Percentiles:

Percentile	PHP
0%	-71,669
25%	303,164
50%	381,945
75%	460,838
100%	852,090

End of Forecast

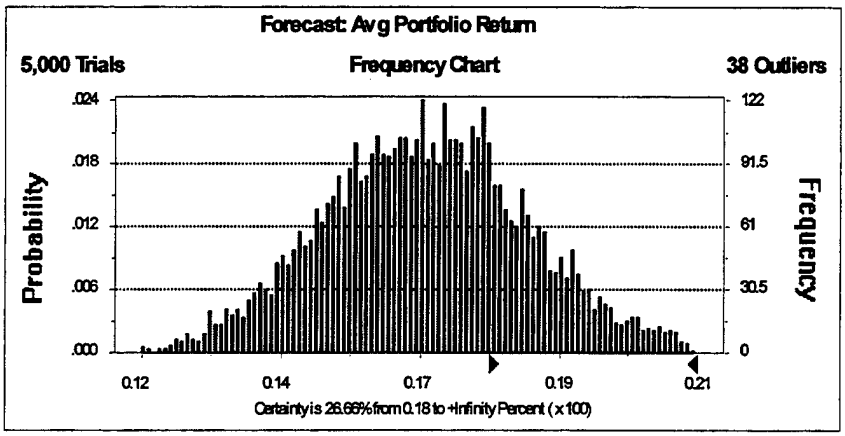
APPENDIX L

Scenario # 3
Crystal Ball Report
Simulation started on 11/19/00 at 22:55:17
Simulation stopped on 11/19/00 at 22:56:08

Forecast: Avg Portfolio Return **Cell: C47**

Summary:
Certainty Level is 26.66%
Certainty Range is from 0.18 to +Infinity Percent (x 100)
Display Range is from 0.12 to 0.21 Percent (x 100)
Entire Range is from 0.10 to 0.23 Percent (x 100)
After 5,000 Trials, the Std. Error of the Mean is 0.00

Statistics:	Value
Trials	5000
Mean	0.17
Median	0.17
Mode	---
Standard Deviation	0.02
Variance	0.00
Skewness	0.04
Kurtosis	3.09
Coeff. of Variability	0.10
Range Minimum	0.10
Range Maximum	0.23
Range Width	0.14
Mean Std. Error	0.00



Forecast: Avg Portfolio Return (cont'd) **Cell: C47**

Percentiles:

Percentile	Percent (x 100)
0%	0.10
25%	0.15
50%	0.17
75%	0.18
100%	0.23

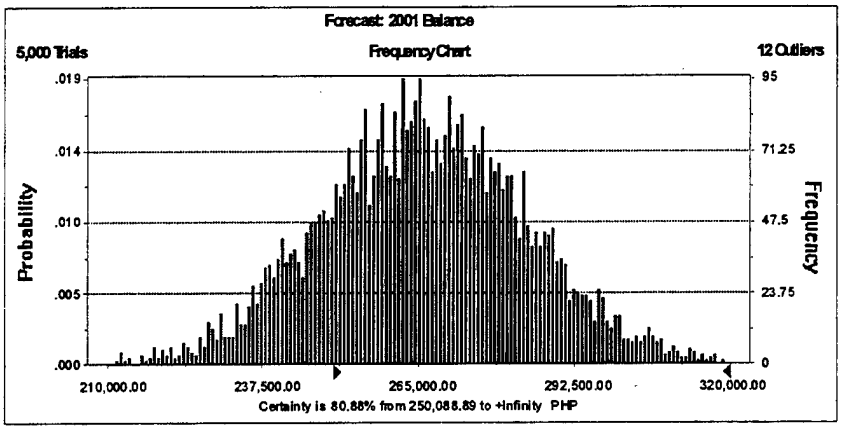
End of Forecast

Forecast: 2001 Balance **Cell: G26**

Summary:

Certainty Level is 80.88%
Certainty Range is from 250,088.89 to +Infinity PHP
Display Range is from 210,000.00 to 320,000.00 PHP
Entire Range is from 205,787.50 to 336,491.47 PHP
After 5,000 Trials, the Std. Error of the Mean is 257.09

Statistics:	Value
Trials	5000
Mean	265,990.72
Median	265,798.13
Mode	—
Standard Deviation	18,179.02
Variance	330,476,649.17
Skewness	0.03
Kurtosis	2.97
Coeff. of Variability	0.07
Range Minimum	205,787.50
Range Maximum	336,491.47
Range Width	130,703.97
Mean Std. Error	257.09



Forecast: 2001 Balance (cont'd) **Cell: G26**

Percentiles:

Percentile	PHP
0%	205,787.50
25%	253,599.44
50%	265,798.13
75%	278,343.65
100%	336,491.47

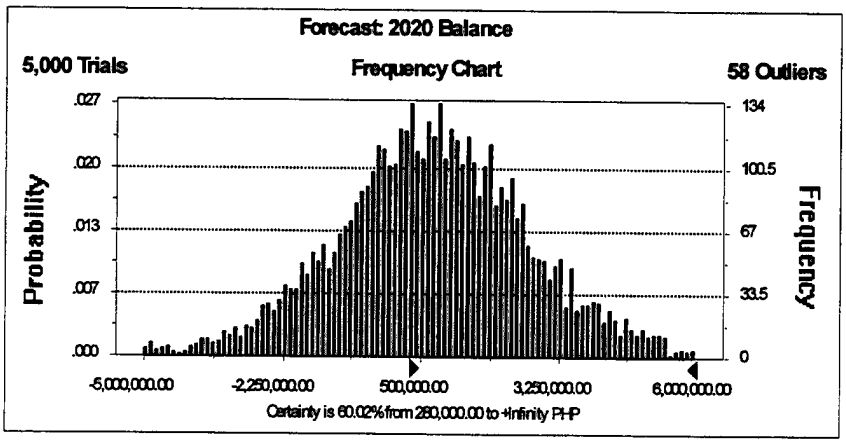
End of Forecast

Forecast: 2020 Balance **Cell: G45**

Summary:

Certainty Level is 60.02%
Certainty Range is from 280,000.00 to +Infinity PHP
Display Range is from -5,000,000.00 to 6,000,000.00 PHP
Entire Range is from -7,052,405.67 to 8,888,398.01 PHP
After 5,000 Trials, the Std. Error of the Mean is 28,127.11

Statistics:	Value
Trials	5000
Mean	762,171.39
Median	754,066.91
Mode	---
Standard Deviation	1,988,886.79
Variance	3.96E+12
Skewness	0.01
Kurtosis	3.60
Coeff. of Variability	2.61
Range Minimum	-7,052,405.67
Range Maximum	8,888,398.01
Range Width	15,940,803.68
Mean Std. Error	28,127.11



Forecast: 2020 Balance (cont'd) **Cell: G45**

Percentiles:

Percentile	PHP
0%	-7,052,405.67
25%	-475,838.38
50%	754,066.91
75%	2,010,286.61
100%	8,888,398.01

End of Forecast

APPENDIX M

Step-by-step Simulation Procedures

The step-by-step procedures used to run the simulations are provided to serve as a basis for future research. This is intended to assist future researchers set up and run a simulation model. This model use Microsoft Excel spreadsheet, and the simulation is run using "Crystal Ball" add-in program.

1. Loading Crystal Ball

Before starting the simulation, the add-in program must be loaded to the spreadsheet. To do this, click on the "Tools" command at the top of the menu bar, which produces a drop down menu. Next, at the bottom of this menu click on "add-in". Assuming that the simulation program "Crystal Ball" is loaded in the computer, click on "CB" and then "Load". This adds Crystal Ball into the spreadsheet.

2. Setting Probability Distributions

The next step is to define the probabilistic distribution of the data within the spreadsheet. Normal distribution will be used throughout the model. In order to do this, click on the "Cell" command at the top of the menu bar, which produces a drop down menu. Next, at the top of this menu click "Define Assumptions", which produces a probability distribution to choose from. Choose "Normal Distribution" and click "OK". Next, input the mean and standard deviation of the historical data.

For example, in order to define the S & L Return distribution, look at the mean and standard deviation, which was copied from the historical data to the worksheet. Type in 22.24% in the "Mean" box , and type in 1.07% in the "Standard Deviation" box, click "Enter", then click OK". Do the same thing for High-cap Return; T-bills Return; T-bonds Return; and yearly changes in investment, experience refund, and inflation rate. Once the probability distributions are successfully inputted, click on "Cell" and click on "Cell Preferences" on the drop down menu. Choose the color you want to apply to the assumption cell. This is merely a guide for users so that they can visualize which spreadsheet cells have probability distribution defined.

3. Defining the Forecasts

The next step is to "Define the Forecast" cell(s) within the simulation model. The purpose of the model is to determine how the portfolio returns and the fund balances change in response to different scenarios. Therefore, the spreadsheet cells that contain these titles serve as the forecast cells. In order to do this, first highlight the cells that are designated as "Forecast Cells". Next click on "Cell" at the top of the menu bar. From the drop down bar, click on "Define Forecast" command, and a new command box appears. In this box, fill in the required name and units for the forecast, then click "OK". To put color on the forecast cell(s), click on "Cell", click on the "Cell Preference" on the drop down menu, choose the color you want for the forecast cell(s), then click "OK".

4. Running the Simulation

At this point, the simulation is set-up and ready to run. At the top menu bar, click on the "Run" command. Next, click on "Run Preferences" in order to choose the number of simulation trials to run and the type of simulation. This simulation was set for 5,000 trials using the Monte Carlo simulation. Click on "OK" to set these preferences. Once again, click the "Run" command at the top of the menu bar on the "Run" command at the drop down menu. This starts the simulation. The numbers within the "Assumption" and "Forecast" cells continue to change until 5,000 trials (i.e., iterations) have been generated. The simulation stops when the maximum number of trials is reached. This concludes the simulation process.

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